

Radio Control **CAR ACTION**

CHARGER GUIDE
25 MODELS REVIEWED!

THE WORLD'S LEADING R/C CAR MAGAZINE

47380

December 1995

KYOSHO

**Inferno
MP-5**



**Burn the
Competition!**

ALSO TESTED

TAMIYA Toyota Supra
SCHUMACHER CAT 2000E.C. 4WD

**USA
Rules
the
Off-Road
Worlds**

SPECIAL COVERAGE

New Products
Behind the Scenes
with the Winners
Man Eats Bug!
Who Hacked Who?
the Real Story

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1995

**FIMAR
Off-road**



**WORLD
CHAMPS**



**learn to
SOLDER LIKE
A PRO**

**BATTERY
TIPS FOR
BEGINNERS**

**how to
SET RIDE
HEIGHT**



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Matt Francis:
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Destination Dirt!

Ask any R/C aficionado what the biggest off-road R/C race is and they quickly answer, "the IFMAR Off-Road World Championships!" If you aren't familiar with this race, here's a quick lowdown: every other summer, the world's fastest off-roaders travel to a chosen track in a designated country and battle it out to see who's the baddest—both in 2WD and in 4WD buggy. Since its inception in 1985, when it was held in Del Mar, CA, it has become the most prestigious R/C race. It carries significant weight in the R/C racing community for a number of reasons:



Race Director Kazunori Inami briefs the 2WD A-Main drivers at the 1995 IFMAR Off-Road World Championships. George Gonzalez's full report begins on page 82.

- It's a proving ground at which successful racers can claim the bragging rights of being the fastest R/C'ers for the next two years.
- It greatly affects what the rest of us will race afterward. Most of the advanced technology that's raced there is quickly brought to all of us. Case in

point: at the last IFMAR Worlds, quite a few new cars made their debut—Team Losi's Double-X, Schumacher's Cat 2000 4WD buggy and Yokomo's Works '93 YZ-10 4WD racer; and Associated used the race as a testing ground for their RC10 Worlds car.

Cars weren't the only new things at the track though; there were new motors, tires and all sorts of miscellaneous electronics being used as well; almost all of them made their way to local tracks shortly after the event. Factories go all-out when it comes to the Worlds, because success at that track means success at tracks around the world.

Speaking of major races, elsewhere in this issue, you'll find coverage of Tamiya's Grand Finale race, which was held at their track in Southern California. The winners of the Sedan and F1 classes were awarded not only trophies, but also tickets to Japan to compete in Tamiya's Championship Race at their headquarters in Shizuoka-City. Also in this issue you'll find our comprehensive "Charger Guide" in which we give you the lowdown on every battery booster currently on the market.

Frank Masi, Executive Editor

We want to hear from you! Write, fax, or e-mail us over the Internet: Car Action, Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897; fax: (203) 762-9803; e-mail: Chris Chianelli—chris@airage.com; John Howell (Doog)—johnh@airage.com; Frank Masi—frankm@airage.com.

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LETTERS

UNPAINTED BODIES...UUUGH!

First, way cool mag! On a scale of 1 to 10, your magazine would get a 100, meaning 10 times better than the highest rating. OK, here's my question. I own a Double-XT and a Novak Racer speed control. I want to put 10 cells in it. Will the speed control hold up? What motor can take this many cells? Also, will the truck's gears and drive train hold up? Another thing, can you use 13-gauge wire on your ESC for racing? If you can that equals less resistance, less heat and more power. And if racers are trying to save weight, why not just leave their Lexan bodies unpainted? Paint weighs something, right? Makes sense to me! How old do you have to be to race? Well, thanks for your time, and keep up the good work!!

LOGAN CARSWELL
Pataskala, OH

Here's the deal, Logan.

1. Yes, your Racer can handle up to 10 cells.
2. As for a motor selection, stay with a modified motor in the 13- to 15-turn range.
3. The truck's gears should hold up fine. Just make sure you do your maintenance chores on a regular basis, and you'll be OK.
4. I talked to Tyree Phillips from Novak and this is what he said, "It comes with 12-gauge wire, which is larger than 13 gauge, so why switch?"
5. Blasphemy! How dare you show up at a race without a painted body! Just kidding. I guess you

could show up at a race without painting your body, but if I see you, I'll laugh at you.

6. There are no age restrictions when it comes to R/C car racing. The youngest racer I've heard of so far is five or six years old. Thanks for the compliments. Have fun racin'!

Doogie

BIG-TIME ELECTRIC FUN

I was wondering if any companies plan on making an 1/8-scale, electric, off-road buggy or racing truck. I would buy one on the spot. Why aren't companies coming out with these? I would think that these cars would be totally exciting. Also, I have four battery packs, and my car runs fine on the first three, but when I run an older pack, which I borrowed from a friend, my car runs really strange. It takes off when the trigger is pressed and released and glitches like crazy. I know it has to be the pack because the other packs run fine. Please help!

ROB HALL
Troy, MI

Well, Rob, about the closest thing to an electric 1/8-scale car you can get is an MRC World Scale buggy or truck (actually 1/7 scale). Check out our August and September '93 issues for more info on the World Scale vehicles.

Your battery-pack dilemma is very interesting. I asked around, and there could be a number of reasons why it glitches. The battery might be completely shot; it might not be providing enough voltage to your ESC's BEC circuitry. Maybe the connectors are loose and aren't making proper contact. Is it possible that the wire is frayed and is rubbing and making contact with something that's disrupting the flow of current? If worse comes to worse, don't run that pack anymore; try another one.

Doogie

TOO ROUGH ON LOCAL TRACKS?

The purpose of this letter is to respond to the article on the new RC10T2 in the September '95 issue of Car Action. My concern has nothing to do with your evaluation of the new truck, but more with your comments on the poor condi-

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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LETTERS

tion of the outdoor tracks you selected for testing.

First, I feel it is only fair to let you know that I am a parent of a 16 year old who has been racing for only a few months, so obviously my letter is not meant to be a challenge to your knowledge, understanding, or experience. My son has raced at two tracks other than R/C Madness in Enfield, CT. Also, while on business, I observed this year's regional truck race site in Massachusetts. These tracks did not in any way look superior to Enfield. I am sure you have been to national and world races and

have experienced perfect track conditions. But I sense that what I've seen is really what the majority of weekend racers experience throughout the country.

If I were reading the article and had not visited R/C Madness, I would probably be reluctant to take my son racing there. Your comments about this track were all negative. I'm sure your goal was to emphasize the strength of the new T2's suspension, and you did that well. But, I don't think that you did much to promote that track or the hobby.

I've hung around R/C Madness for the last eight

or nine Sundays, and I can honestly say I've never heard anyone comment on how bad the track conditions are. In fact, most say they are thankful to have a facility to race at for only \$5. I have also listened to people in the pits comment on how many sets of tires are used at bigger team-sponsored-type race-tracks. How would that type of track in Enfield or Seymour be affordable to the majority?

My final comment is that it isn't often that the small guys get mentioned in a nationally circulated publication. That in itself can be very rewarding, however, to do so in this context nullifies the benefit. **GEORGE ROUSHON**
Wethersfield, CT

In describing the rough conditions of these two tracks, my intent was not to warn people away for fear of breaking parts; rather, I wanted to make it clear that these tracks were "real" off-road venues, with all the rocks, dust and bumps that you'd find at almost any club track. I actually prefer to race on these types of tracks because of these conditions; a bumpy track is a great equalizer because setup and driving play a larger role than equipment.

I share your feeling about club racing, and my comments in the T2 article were intended to show support of club tracks and the people who put in the hours necessary to hold weekly events. With substantial funds from sponsorship and entry fees, any competent track can hold a national-caliber event, but it's the local clubs and their weekly races that are the backbone of the R/C racing industry.

I hope that this clarifies the statements that I made and my position on the subject. We welcome comments and criticism from readers, so if you've got a beef, let us know! We do listen. And if you're ever in Connecticut, check out R/C Madness and JP's Hobbies, you'll have a great time, and you might even see us there—if they'll let us back!

Frank

Thank you for your letter, George. In fact, we've received several others from local racers expressing similar concern that our T2 article was a bit harsh on local tracks, so please indulge me as I attempt to clarify my comments in September's issue.

Both tracks (RC Madness and JP's Hobbies) were chosen as the test sites for the new T2 because they're close to our editorial offices, and I felt that their surfaces best represented those at average club tracks. To test a vehicle such as the T2 on a meticulously groomed, smooth, "blue-grooved" track, would be to deny readers an accurate performance evaluation. Based on our experience, it's fair to say that very few club racers have had the opportunity to run on national- and world-class tracks.

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ELLIS'S IMPACT

This rather zooty-looking 1/10-scale Serpent Impact belongs to avid gas racer Glenn Cauley of Gloucester, Ontario, Canada. Powered by a Mega SX-15 engine, Glenn's Impact has a 2-speed tranny and two JR NES-4735 servos (which handle the throttle and steering chores), and it's piloted around the track with help from an Airtronics Caliber 3P. The Dahm's Spice WSC body has an interesting paint scheme, doesn't it? It was "lifted" from a Perry Ellis-sponsored Buick GTP car that was painted by renowned artist and painter Randy Owens. According to Glenn, it took 13 jars of Pactra R/C paint to get the range of colors that he needed.



CATTLE CRUSHER

Out diggin' in the dirt is this fine-looking Traxxas Stampede from Art Bartlett of South Glens Falls, NY. Art, aka "The Bartman," has his Stampede equipped with a Traxxas XL-1 ESC, a slipper clutch, a Trinity 17-turn Sapphire motor and a full set of ball bearings. Apparently, The Bartman smoked his Traxxas receiver by submerging it in a puddle, so he replaced the radio system with a JR Python setup. We aren't sure, but we think it wasn't The Bartman who drove through the puddle; must have been Homer.

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fourth annual "Reader's Ride of the Year Contest" in the fall of 1995. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

THE FASTEST TRUCK?

Matt Brown of Gillette, WY, sent us this photo of his new, tricked-out Team Losi Double-Xt. Matt styled out his ride with a Novak Hammer Pro ESC, a Novak receiver, Trinity World Tech batteries, a Team Kinwald 11-turn motor for racing and an S&K Iron Man stock motor for play. During his first week with the truck, Matt raced it twice at the Wyoming Radio Control Car Club and came in first—both times! He tells us that with the Kinwald motor, his Double-Xt is the fastest truck he has raced during his five-year racing career. Hmmmm.... What would Brian Kinwald have to say about that?



SMASHING A LEGEND

This crazy car-crushing scene comes to us from John Klingman of Ft. Atkinson, WI. John modified his old Clod with an ESP Clodzilla II long-wheelbase chassis kit, oil-filled aluminum shocks, two Trinity Monster Mash motors, a Novak 610 RV ESC, a Trinity 4400mAh battery pack, aluminum wheels, and bumpers (triple-tube up front and a twin-tube in the rear). Whew! That's a lot of mods! The truck is topped off with a Parma '94 Dodge Ram truck body. John's Bolink Legend is equipped with a Trinity 12-turn Diamond motor and a Novak Rooster ESC. He says the car is so fast that he sometimes can't turn it! Well, John, if it's so fast, how did it manage to get itself into this predicament?

In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



So, have all of you been good little R/C'ers this year? Have you been writing your letters to "Chianellliclaus?" If so, then maybe I have something in the back of my big-block-powered sleigh here for you! Also, you might want to check out some of the hot holiday goodies in this special, holiday edition of "Inside Scoop." Enjoy, and happy holidays!

Did you know that beautifully painted racers go faster? It's true, you just gotta believe it! Well, at least this much is certain: if you show up at the track with a new, professionally airbrushed body for the MRC MT-10M, the guy with that crummy, sloppin', drippin' monotone mess of a paint job will be so shaken by the magnificence of your truck that come race time, his timing will be affected. No masking, cutting, painting, or fumes. It's all done for you. The downside?—no more entertaining moments supplied by your mom. You know, when she frantically pounds on your bedroom door screaming, "What are you doing in there? What's that strange smell? I'm telling your father!" Well, you can't have everything. But you can have one of the sharpest truck bodies you've ever seen. List price: \$49.98. See your hobby shop, or call MRC at (908) 248-0730.

BE BAD—LOOK PRETTY



Goodies Galore for the YR-4



More and more aftermarket companies are realizing that the YR-4 is quickly becoming the car of choice for "serious parking-lot racers," and they're producing tons of go-fast goodies for this hot rig. One such company is Factory Works, which recently revealed a few new releases for the Yoke. Let's take a look, shall we? They have a really

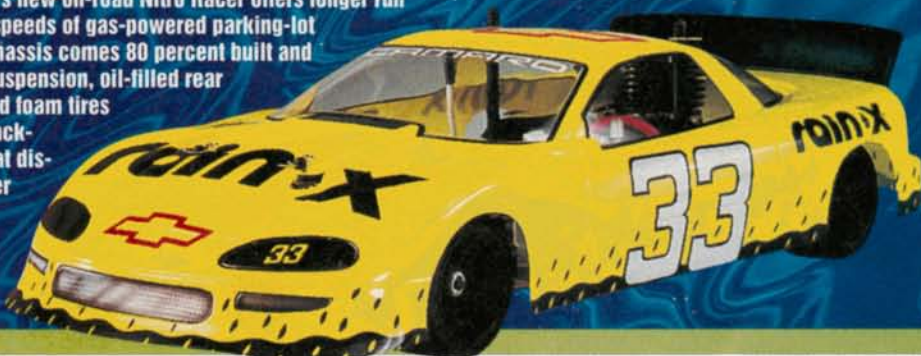
cool narrow Kydex bumper, a set of black fiberglass shock towers with more shock-mounting and camber-rod placement holes and a hex-drive adapter kit that allows you to use HPI or Tamiya-style wheels. And they're just getting started! Stay tuned for more YR-4 goodies from them soon. For more info, contact Factory Works at (909) 735-5516.

According to Thunder Tiger, the Challenger Pro is a 4WD, nitro-powered, 1/10-scale buggy with the sophistication of an expensive 1/8-scale machine. The Pro features a black-anodized, aluminum chassis, hard-anodized, oil-filled, coil-over shocks, three metal-gear differentials, a tuned-exhaust system, universal-type half-shafts, a complete ball-bearing set and center-mounted disk-brakes. The Challenger is a total race machine right down to its low-profile, 2.2-inch, pin-spoke tires. Foam inserts included!



A TIGER FOR ANY TERRAIN

With a 75cc fuel capacity, Thunder Tiger's new on-road Nitro Racer offers longer run times for those who love the blinding speeds of gas-powered parking-lot racers. The time-proven "pan-style" chassis comes 80 percent built and features A-arm front suspension, T-plate rear suspension, oil-filled rear shocks, an adjustable ball diff and brakes, trued foam tires mounted on lightweight nylon wheels and a black-anodized aluminum chassis for rigidity and heat dissipation. The Challenger Pro and the Nitro Racer come with Thunder Tiger Pro12BZX pull-start glow engines. For more info, contact Thunder Tiger USA Inc., 2430 Lacy Ln. #120, Dallas, TX 75006; (214) 243-8238; fax (214) 243-8255.



INSIDE scoop

Looking for a new sedan body? If you are, check out these two, hot, new "Lexan lookers." This hot-lookin' body from the "Mold Man"—Protoform's Dale Epp—is a new Saturn SC2 Coupe (no. 1405) that's available for Tamiya and Yokomo 4WD and FWD sedan chassis. Molded in 0.030-inch-thick Lexan, this stylish NORRCA-legal body includes an add-on spoiler and is already a race winner like the full-size SCCA-winning Saturns. List price: \$19.95. For more info, contact Protoform at (905) 646-7638; fax (905) 646-2476.



Daily Drivers?



This new Volvo wagon from Factory Works is also made of 0.030 Lexan, and it fits the Yokomo and Tamiya sedans. For more info, contact Factory Works at (909) 735-5516.

TRINITY HAULER BAGS

New from Trinity are these cool-looking "Monster Hauler Bag" car-carrying bags. They're made of heavy-duty canvas and come with hand and shoulder straps. They also feature inside, side pockets for batteries,



tools and whatever else you can fit in there, plus compartments on each end for storing tires, transmitters, etc. The bag is available in black with Trinity purple trim and costs \$49.99—no. 9075. For more info, contact Trinity at (908) 862-1705; fax (908) 862-6875.

HAVE YOU BEEN SCREWED BY TRINITY LATELY?



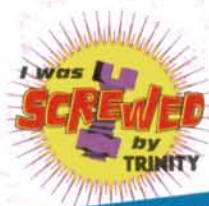
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NEWS BRIEFS

RC10T2 and GT Sweep Reedy Truck Champs

Pomona, CA—Team Associated/Reedy ran away with the 1995 Reedy Invitational Truck Champs run by NORRCA and hosted by the Ranch Pit Shop. Richard

Reedy motors. Richard also TQ'd and won in Gas, with Jason again coming in second and Austin Dvorak in third. All three drivers used RC10GT trucks powered by O.S. Max .12 engines.



Saxton (on right) TQ'd and won the Invitational Electric class, Jason Ruona took second place, and both drivers used all-new RC10T2 trucks powered by

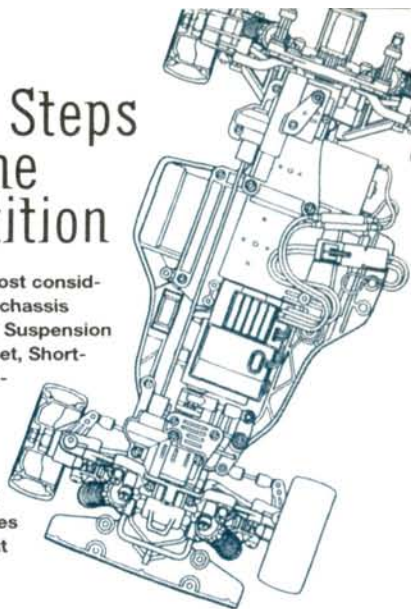
Open Modified winners Todd Cariseo (first),

Bryce Beaver (second) and Colin Macrae also used Reedy-powered RC10T2s. Misty Fossum presented the awards to the lucky winners.

Tamiya Steps Up to the Competition

In a special, limited-edition offer, Tamiya has taken their race-winning TA02 chassis and added the top 16 hop-up items that R/C'ers request the most.

Purchased separately, these hop-up items would cost considerably more than the price of this new TA02 racing chassis alone. The options include Tamiya's Stainless Steel Suspension Shaft Set, Universal Shaft Set, Speed Tuned Gear Set, Short-Type Hard Propeller Shaft, Aluminum King Pins, On-Road Tuned Spring Set, Rear Stabilizer Set, 4WD One-Way Diff Unit, Shaped Tire Inserts, Aluminum Pressure Plate, Super Slicks and Wide Super Slick Tires, Wide Inner Sponge Set (hard), Front Spoke Wheels and Wide Rear Spoke Wheels. Not included are a body kit, a speed control and a motor—choices left up to the racer. For more info, contact Tamiya at (714) 362-2240; fax (714) 362-2250.



NOSTALGIC PICKS FOR '96

Scale classic lovers, this is just a sample of what Kyosho's new Nostalgic Series has in store for us. All I can tell you now is that these nitro-powered machines are 4WD for easy driving and are true 1/10 scale in every way. Kyosho has already hit on my favorite—the 427 Cobra. If you don't see your favorite here, hold on! There's much more to come in early '96.

Pro-Racer Silicone Shock Oil

"Whether you race at the North Pole or the new track in Hell, our oil stays true to weight."

- Oil weight remains stable under increasing track heat, so suspension set-up won't change
- 1/2 weights from 10-70
- Allows precise tuning of your suspension to match changing track conditions



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All Weights



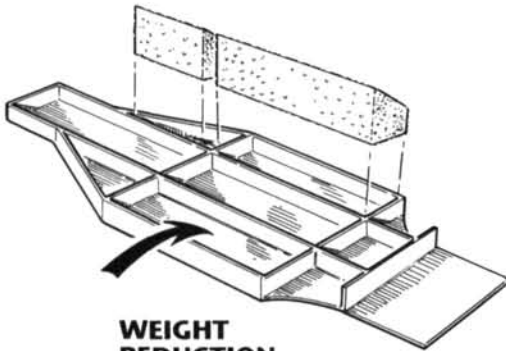
Trinity Products, Inc.

1901 E. Linden Ave, #8 Linden, NJ 07036
(908) 862-1705 • Fax (908) 862-6875



PIT TIPS

by Jim Newman



WEIGHT REDUCTION

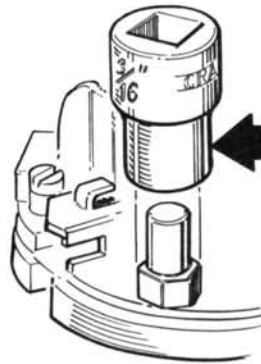
To prevent mud from getting trapped in your chassis and adding extra weight, fill the spaces in the chassis with sloped, rigid foam blocks.

Freddy Peterson, N. Augusta, SC

ROLL-PIN REMOVER

To remove roll pins easily, grind a slot in one jaw of an old pliers, and drill the other jaw to accept a music-wire dowel or an Allen key that's been cut to size. Solder this piece into place.

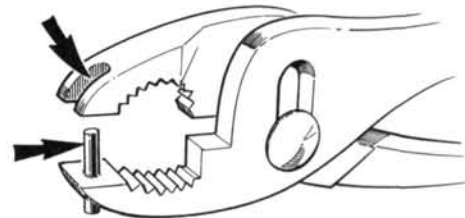
Mike Rommel, Prince George, BC, Canada



EASY-OUT SPRING POSTS

A tapered, $\frac{3}{16}$ -inch socket wrench fits nicely into the restricted space on the motor and makes it easy to unscrew the posts.

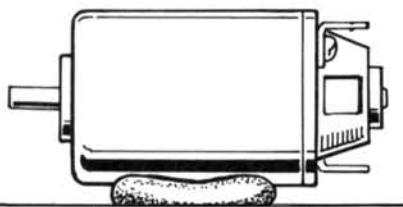
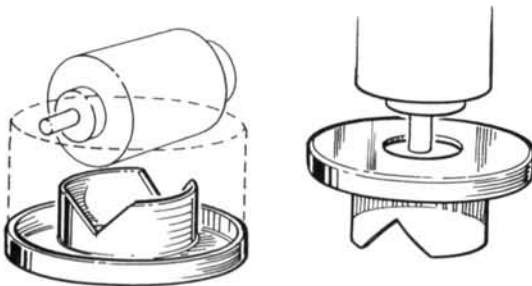
James Alenka, Chicago, IL



NO-COST MOTOR STAND

To hold the motor horizontally, cut two V-shape notches into an old spray-can cap. To hold the motor vertically, invert the cap, and drill a $\frac{7}{16}$ -inch-diameter hole (11mm) to accept the end of the motor.

Aaron Hill, Aurora, CA



TACKY MOTOR HOLDER

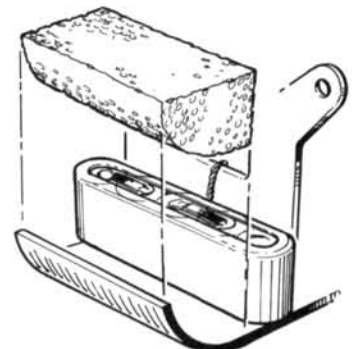
When you solder wires onto your motor, squash the motor into a lump of poster putty so that it doesn't roll around the bench.

Tom Dembowski, Monroeville, PA

RC10GT STRENGTHENER

If you use a 600mAh mini-receiver pack, support the area behind the batteries by filling it with hard insulating foam that's shaped to fit.

Matteo Logrande, San Pedro, CA



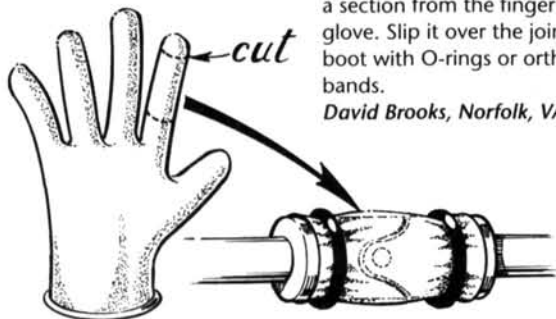
Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



UNIVERSAL JOINT BOOT

To make a waterproof, dust-proof boot, cut a section from the finger of an old surgical glove. Slip it over the joint, and secure the boot with O-rings or orthodontic rubber bands.

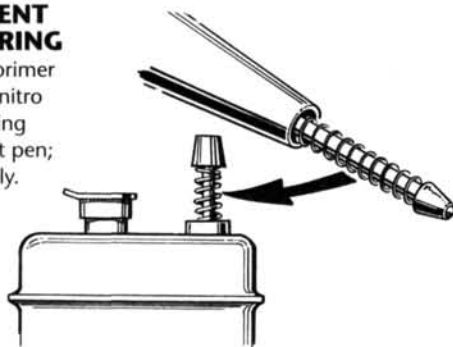
David Brooks, Norfolk, VA



REPLACEMENT PRIMER SPRING

If you lose the primer spring on your nitro car, use the spring from a ballpoint pen; it works perfectly.

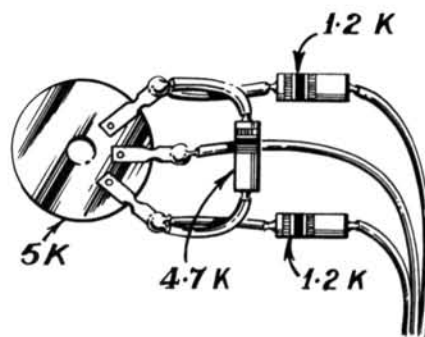
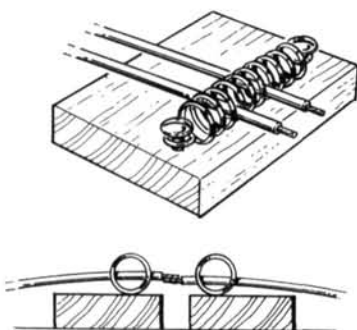
Justin Johnson, Wellington, KS



SPRINGY SOLDER JIG

Screw a spring to a block of wood, then trap wires to be soldered between the coils. If you need to join wires, put two jigs face to face as shown.

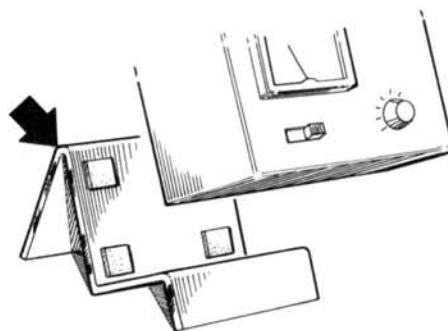
Derek Loe, Corona Del Mar, CA



REDUCED STEERING TRAVEL

Break into the leads on the transmitter steering potentiometer, and solder the resistors as shown. This modification reduces servo travel and allows "softer" control. If the pot is not 5K, make the center resistor the same value as the pot and each of the remaining two only 1/4 of the pot value. Warning: these modifications will void your radio warranty.

Rob Kuhnemund, Ormond Beach, FL



BUDGET CHARGER STAND

Use an old desk-calendar stand to hold your charger at an angle so you can read the meter. Hold it in place with squares of double-sided foam tape.

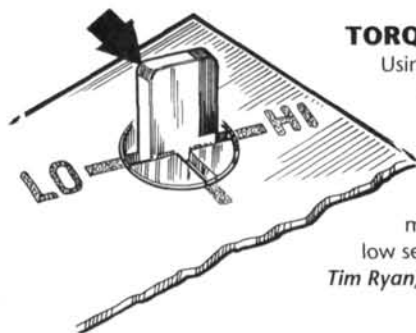
Jay Jackson, Abingdon, VA



SAFE CHARGING LEAD

If the alligator clips on your leads don't fit your car's battery terminals, use a 10-foot-long lead (3 meters) with a cigarette lighter plug on the end, and plug it into the cigarette lighter. Depending on the type of terminals you have, use alligator clips or banana plugs on the opposite end. This method is far safer than clipping plugs to your automobile battery, where sparks can possibly cause an explosion of the battery's hydrogen.

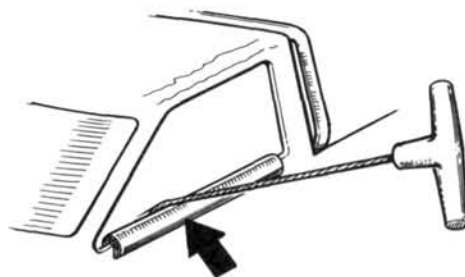
Marcus Villanueva, Georgetown, TX



TORQUE-CONTROL KEY

Using a tiny drop of glue, glue a short plastic tab into the slot of the torque-control potentiometer. Paint one edge of this "key" a bright color, then paint marks at the high, middle and low settings for easy reference.

Tim Ryan, Wading River, NY



RC10GT WINDOW PROTECTOR

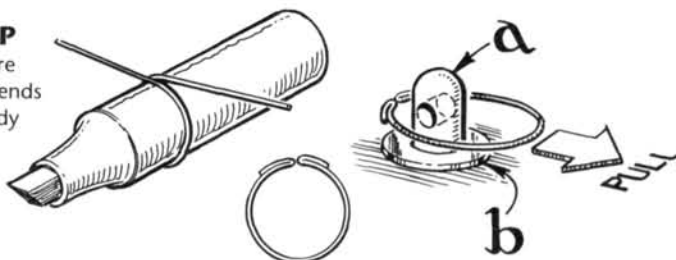
Glue split plastic tubing along the lower edge of the window opening so the starter rope doesn't cut into the plastic body shell.

Jeremy Lawrence, Walnut Creek, CA

SPORTY BODY CLIP

Bend thin music wire or hard copper wire around a felt-tip pen as shown. Bend the ends back on themselves, and gently pull the body clips into place on the body posts (a). Paint the posts silver, and glue a chrome washer (b) to the body shell.

Henry Bernaldo, Abu Dhabi, United Arab Emirates



E-Z SNOW BLADE

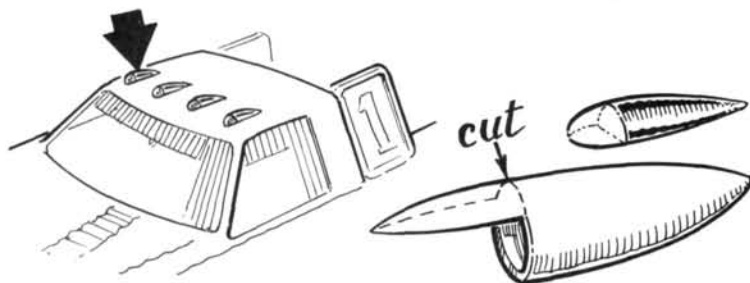
Cut a "snow blade" out of a coffee can, and mount it on your truck with screws and the appropriate brackets. Now you can do a little plowing this winter.

Dan Lewis, South Amherst, OH

HELD "CAP" TIVE

To avoid losing fuel caps, save the captive cap from a household products bottle, and use it on your fuel container.

Jarvis Muschamp, Los Angeles, CA



FAKE MARKER LIGHTS

Cut and shape translucent ballpoint pen caps as shown. Polish the "lens" with metal polish, and paint the remaining portion silver, leaving the colored lens exposed. Glue them to the top of the truck.

Andrew Lund, Salt Lake City, UT



What Do I Do If... Secret Tips from the Field

IT'S EASY to make repairs when you're safely nestled in your workshop and you have access to your tools, supplies and spare parts. But what happens if you're at a parking-lot race, a dirt off-road track, a ballpark, or a schoolyard and something needs to be

fixed? Sure, you might have some basic tools and spare parts with you, along with a couple of spare battery packs, but it's unlikely that you would have much else. To make things even more difficult, most outdoor facilities aren't close to a hobby shop, so you can't just walk down

the street and pick up the part you need.

So, with the understanding that sometimes you have to improvise, I've come up with some tips that will help you survive in the real world. These ideas will keep you going even when you're faced with a minor catastrophe. They've been tested in the field, and although some of them sound pretty hokey, they do work. They won't make

your equipment better looking, but they'll enable you to keep driving.

Now, imagine yourself at the track with your buds. The weather is great, and you're having a super time until something goes wrong. What would you do in the following situations?



Bubble gum, battery tape, Band-Aids and a piece of plastic bag are all insulators in disguise!

CHEAP INSULATION

Let's say you've found a frayed wire coming off your battery pack. You know that if you ignore it, it may rub through and cut off the voltage. That will end your ride in a hurry. Even if the wire has been cut, you can still remove some of the insulation and twist the ends together to make a connection. Unfortunately, it could easily short out against the metal chassis, the speed control, or another wire, and then you'd be looking at disaster. Dead shorts not only destroy electrical components like speed controls, but they can also cause the battery cells to overheat and ignite. Ever see a Ni-Cd battery burn? It's not a pretty sight!

All you have to do is keep the wire from rubbing against conductive surfaces, and any non-conductive substance will accomplish that. I've used bubble gum to provide pretty good insulation for a couple of runs. It looks really dorky, but if the car still runs, who cares?

You could also poke through a trash can for a piece of plastic or cloth to wrap around the splice or the worn section; just make sure you tie the ends of the plastic or cloth together so they don't wrap around the axle or the wheel. Band-Aids and battery strapping tape also work well; lots of people carry these in their toolboxes. One time, I slipped a short section of tree bark onto a spliced battery wire. It worked, and kept me from having to end my fun before the day was over.

ALTERNATIVE SHOCK FLUID

You need shock fluid, but you don't have any with you. This actually happened to me at one of the Tamiya races in California. I had flown out there for the race, and I hadn't taken any shock oil, because I was afraid it would leak all over my stuff. Bad move! My suspension was way too soft, and my car was bouncing and "boinging" all over the track. Nobody else had any thick oil they could let me use, and the hobby store wasn't open yet. There was no way I could drive the car the way it was. I tried shampoo that was in my suitcase. It actually worked for a couple of minutes, but then it foamed up and made handling too unpredictable. At least, now I knew how thick the fluid had to be! Hand lotion and suntan lotion were next. I was on the right track, but this stuff still wasn't thick enough. I suspect that hair gel would have been the right consistency, but I'm not a slicked-back kind of guy. Mayonnaise from the snack bar definitely improved the car's handling, but it was a little too thick. I needed something to make the viscosity a little greater, but the salad dressing had too many little spicy pieces in it, and I was afraid that they would clog up the piston holes and lock up the shock absorber. Ketchup mixed with mayo (in equal proportions) did the trick. I finished second in my final qualifier. The people around me in the pits thought I was extremely weird, however.



Shampoo, hand lotion, suntan lotion, mayonnaise and ketchup can all be used for shock fluid in a pinch. Improvise!

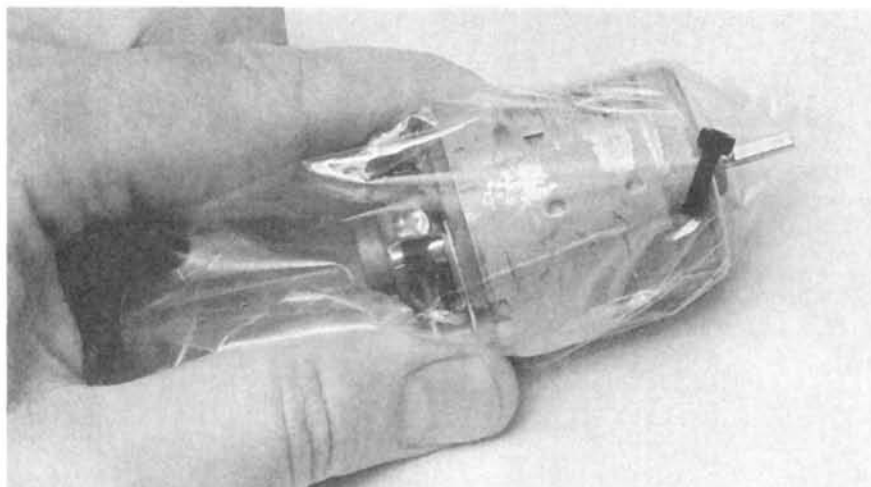


SCREW FINDER

You've lost a metal nut, a bolt, an e-clip, or a screw in the dirt or grass, and you don't have another one to replace it.

This is a tough one. You can look over your chassis to see if there's a similar part to replace the one that got away, but today's high-tech cars and trucks don't typically use any non-critical metal parts. If you've trampled the area where the part landed, nothing will help you but blind luck. If the part is made of steel or iron, however, and you have a pretty good idea of where it is, you may be able to find it.

Remove the motor from your car or truck, and wrap it in a thin plastic bag or a piece of plastic wrap from the sandwich you brought for lunch. Once again,

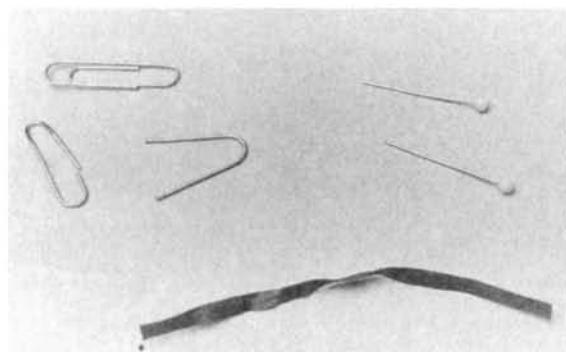


Wrap your motor in thin plastic, and go hunting for that elusive, lost motor screw.

scout through the trash can if you have to. You can try this without the bag, but your motor may pick up some nasty metal like staples or body clips. Now, holding the motor in your fingertips, drag it through the area where you think

the part fell. Sweep it back and forth over a section about 1 foot square. Keep the motor close to the grass or dirt. Because of the magnetism of the motor's can, the part might jump out of the grass and stick to the can.

If you don't have any luck, search more of the area; it's amazing how far those little guys can bounce!



Paper clips can be cut into two body clips. Pins, safety pins or wire twist ties also work well.

BODY-CLIP BINGO

You've lost your body clips. I'm convinced that body clips are naturally occurring phenomena. People never really buy them; they just come in kits and pop out of the ground wherever R/C people congregate. I don't think I've ever actually bought any body clips, yet the supply in my toolbox never seems to dwindle. Maybe that's because I'm always looking on the

ground when I'm marshaling at the races, and I pick up the ones I find and toss them in my box back at the pits. Plus, I usually have one stuck in the transponder hole in the body of my car or truck; I can use that one in a pinch if I'm not racing. If I'm racing, then I'll have a box of spare parts containing body clips with me in the pits.

Not everyone is so fortu-

nate or well prepared. I know people who are always looking for a body clip, because the things keep disappearing. Week after week, heat after heat, the same poor guy will be scrambling around at the last minute looking for a body clip or two.

A paper clip could be substituted for a body clip. Like body clips, these seem to propagate wherever there are papers. I find them on the floor of my car, the street, in my briefcase and where pens and pencils tend to hide. Each one can be cut into at least two body clips. Try straight pins or safety pins. To keep the pin from falling out, bend the straight pin after you've put it through the hole. The safety pin just clips neatly, and it won't fall out, either. Staples won't work; they're too short. Nails are usually too thick to go through the

hole in the body post. Small twigs will last for a heat or two, especially if you strip the bark off them first. (You'll have that rustic look.) Try running a piece of string or thin wire through the hole, and then wrap it around the body-post stub a couple of times to hold the body on. Looks terrible, but works great! If you use a shoelace, put it back in your shoe before you marshal.

I bet that you've come up with ways to keep your car running when you're out in the boonies. How about sharing them with the rest of our readers? Send your ideas to my attention at *Car Action*, 251 Danbury Rd., Wilton, CT 06897. If I use your tip in an upcoming article, you'll get full credit. Talk about stardom!



TROUBLE SHOOTING

by John Huber

STRIP SHOW!

I have a Tamiya Pajero with a 540 motor and a Novak 610-HRV ESC. The spur gear keeps getting stripped when I back up. After a while, it won't go in reverse any more, but just grinds the gears. It has done this twice: first, with a Trinity 15-turn, six-wire modified. Now, with the new spur gear and 540 motor, it's so badly stripped that it won't even go forward anymore. Please help!

RYAN SPRINGER
Farmington, UT

There are two possible causes of the damage. First, be sure you have some delay in the ESC's reverse so you don't throw it into reverse while it's going forward

at speed. It may look cool to slam into reverse and spin, but it very quickly does a number on the gears. Also check to ensure that you mounted the motor correctly. I know there are only two possible pinions you can use; make sure you have the screws in the correct mounting



If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

holes. If you use the wrong pinion or mount the screws in the wrong holes, the mesh will be off, and you'll quickly wear out the gears.

KEEP ON RUNNIN'

I have an RC10 Championship Edition that's stock except for a DuraTrax DTX-4 ESC. Using a Sanyo SCR 1400mAh battery pack, my total run time is less than 5 minutes. After checking my connections (they're fine), I ran a 1700mAh pack, but my runs lasted only about 1 minute longer. I keep everything clean and oiled. Help; please help!

Also, are 64-pitch gears better than 48-pitch

gears? If they are, to get better all-around speed, which combination of teeth would I need for the spur and pinion gears?

BRANDON SPARKS
Marshall, TX

Well, Brandon, you didn't specify whether you run a stock motor or a modified one. If you run a modified motor, 5 minutes of run time sounds just about right.

However, here are a few things to consider:

- Are your batteries completely charged? When you take them off your charger,

they should be warm (not hot). Also, what's their condition? Did you ever overcharge them? If you did, you might have damaged them, and you're no longer getting the best juice out of them.

- You say you keep everything clean and oiled. I've seen people accidentally over-lube their gearboxes with grease and motors with oil to the point at which they don't run efficiently. Using more lubrication or grease than necessary translates into drag, and that could reduce run times.

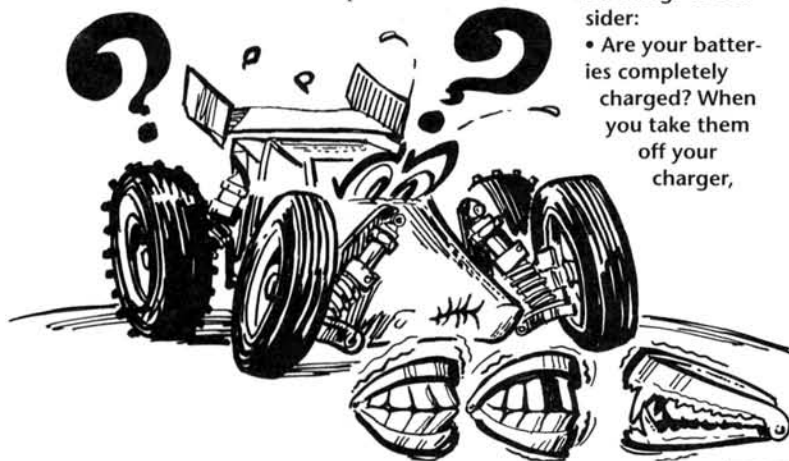
- Is your car properly geared? For a stock motor, try a 24-tooth pinion and an 81-tooth spur, and for a mod motor, try an 18-tooth pinion and an 81-tooth spur or a 19-tooth pinion and an 85-tooth spur.

- Is the motor in good shape? I know you said you keep everything clean, but if the comm is

burnt up, scratched, or pitted, it won't run efficiently. Make sure the motor, springs, brushes and commutator are all in good shape.

- This might sound like an odd thing to consider, but how about your driving style? Are you a "full-throttle, always on the gas, spinnin' the wheels, kickin' up dirt, bendin' the throttle trigger kinda guy," or are you a little more mellow on the pedal? If you're constantly lightnin' up the tires, that could be one cause of your low-run-time problems right there.

Sixty-four pitch gears are a bit smoother than 48-pitch gears, but they're also more delicate. Their smaller teeth make gear-mesh settings more critical and are also more likely to strip. If you run your car on-road, you can probably make do with 64-pitch gears, but for off-road, I recommend 48-pitch. ■



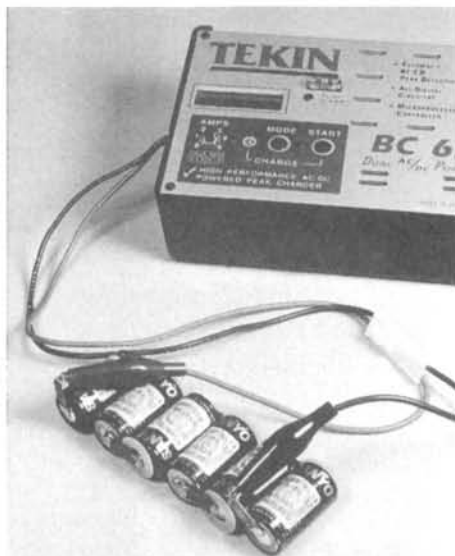
JIM NEWMAN '99



Battery Maintenance

FOR MANY people, batteries are a mystery. Charging and discharging techniques can vary widely, and it seems that almost all modelers have their own methods. These variations in charging and discharging techniques tend to make the whole process seem more complicated than it really is.

I spoke to Trinity's Neal McCurdy about how to keep batteries in peak form. Here's what I found out.



It's best to charge your sport or spec-type packs at a rate of 3 to 5 amps. If your charger doesn't have a variable amp rate, then charge your batteries until they're warm, not hot.

HOW TO CHARGE

For spec or sport packs (usually made with unmatched, 1200 to 1500mAh cells), Neal recommends that you charge the battery pack at a rate of between 3 to 5 amps (this is assuming you have a variable-rate charger). If you charge at a rate that's substantially less than 3 amps, you may achieve longer run times, but performance (more specifically, punch off the line) may be sacrificed. If you use more than 5 amps, performance may increase, but not enough to offset the shorter life that the cells will have. For most sport packs, if you charge at a rate of 4 amps, it will take about 25 minutes to fully charge the pack. If you use packs made with 1700mAh cells, expect charge times to increase to about 35 minutes or longer. To get the best performance possible from the batteries, always use the pack immediately after charging.

WHEN IS IT CHARGED?

Basically, there are three ways to determine when batteries are fully charged:

- Use a peak-detection-type charger. A peak

charger will monitor the battery voltage and shut off as soon as the battery is at its highest voltage level. This method guarantees that the battery will have a full charge without overcharging the cells. Many manufacturers make excellent peak-detection chargers (check elsewhere in this issue for



Some hobby shops use battery-cycling units, such as this Competition Electronics* TurboMatcher. You're likely to find them at shops that have permanent race tracks on the premises.

John Rist's Charger Guide).

- When using a non-peak-detecting charger, monitor the battery voltage while charging takes place. This can be done with an inexpensive voltmeter. Place the voltmeter leads across the battery terminals while the battery is charging. When it's almost fully charged, the voltage on the meter will

slow its upward pace and actually start to drop. When the voltage starts to drop, remove the battery from the charger.

- Check the battery temperature. When the battery is warm to the touch, it's almost fully charged. If it feels hot, quickly disconnect it from the charger before it becomes damaged.

No matter which detection method you use, the whole idea is to stop charging the pack before gas leaks from the battery vents

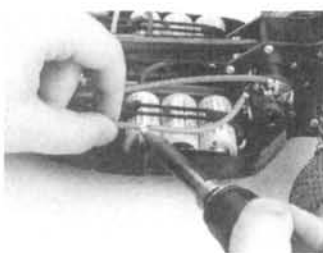
because of overcharging. Once the gas leaks out, it can't be replaced, and the batteries won't be able to hold a full charge.

DISCHARGING

Discharging the battery pack is as important as how it's charging. By not fully discharging a pack, the cells can take on a memory effect that can

Why do some racers hard-wire (solder directly without the use of connectors) their batteries to the motor and the ESC?

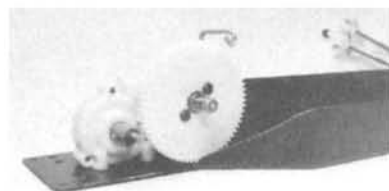
Most racers feel they get that "extra edge" when they eliminate connectors, shorten wires and hard-wire everything. While it's beneficial to keep your ESC and motor wires as short as possible, there really is no need to hard-wire your battery packs in place. Some excel-



lent connectors are on the market that have nearly zero on-resistance and are made of tough materials that last a long time (check out "Connector Inspector, Part 2" in the September '95 issue of *Car Action*).

I've been told that gas-powered trucks don't need a slipper clutch because a clutch is already on the engine. Is this true?

No, it is not true. The slip-



per clutch helps to protect the transmission gears, especially the spur gear. Gas engines have so much power that the spur gear can be easily stripped when your vehicle exits a slow speed corner, lands off a jump or where traction is exceptional. Recently, I stripped

stop them from fully discharging so that they no longer discharge past that point. There are four ways to discharge a battery pack properly:

- Run the motor on your car or truck until it stops. This is a common way to discharge a pack, especially if you're just starting out. No special equipment is required, and it will be pretty obvious when the pack is dead because the motor will not turn over.
- Using resistors or light bulbs is another popular way to discharge your pack. Motor Man* has pre-built, light-bulb-type

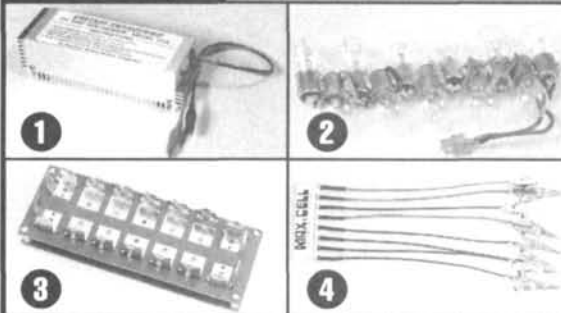
work with any type of pack. (See the August '95 issue of *Car Action* on how to make a light-bulb discharger.)

- Neal recommends placing a 30-ohm, 1- to 2W resistor across the pack after using either one of the discharging methods mentioned above. The resistor helps to equalize all the cells in the pack by keeping all the voltage levels the same. When the resistor is cold to the touch, the pack is ready for charging. If you race, you can leave the resistor on from race weekend to race weekend.

• The best way to discharge a pack is to discharge each cell separately. This can only be done if you use side-by-side packs (packs that have each end of the cell exposed). In this case, a battery tray would be used. The battery tray places a single resistor across each individual cell and allows each cell to discharge separately. Independent discharging of cells is the best way to fully discharge each cell to its lowest level. Trinity* has a discharge tray that uses resistors to discharge each individual cell in the pack. This tray only works with side-by-side battery packs, not stick packs.

Wait until the pack has completely cooled before recharging. This

Different Dischargers



What do all these items have in common? They're all battery dischargers. While they look different, they all function similarly. Vantage Engineering's 25A discharger (no. 1) is equipped with an LED light that goes out once the voltage has dropped to 5 volts. No. 2 is a very efficient lightbulb discharger, but you have to be careful when transporting it. (Motor Man offers prebuilt units.) The battery-discharge tray from Trinity (no.3) discharges side-by-side assembled battery packs using resistors that are placed underneath the tray. The MC2 discharger (no. 4) enables you to place an alligator clip on the end of each battery bar on each cell (assuming that you're discharging a side-by-side assembled pack).*



You can monitor battery voltage with a digital voltmeter while charging your battery to determine when it is fully charged.

dischargers that will discharge your pack at 24 amps. Vantage Engineering* has a discharger that uses resistors instead. Both units will

could take up to 3 hours. To quicken the process, blow cool air on the pack with a fan. Before recharging the pack, make sure the batteries are back to room temperature. Ni-Cds like temperatures between 65 and 85 degrees Fahrenheit.

Keep the following in mind when you charge or discharge batteries:

- Don't reverse the leads from the charger to the pack. Always go red lead to red lead and black lead to black lead.
- Don't short the pack out with heavy-gauge wire or anything else for that matter. It's dangerous and

very harmful to the batteries.

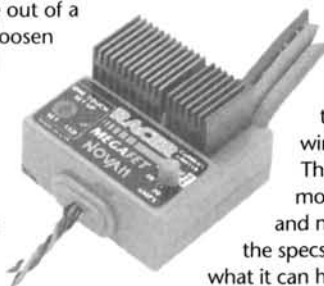
- Don't overcharge the battery pack. If you have a timer-type charger, remove the pack once the batteries get warm, regardless of how much time is left on the timer. (This goes for any type of charger.) Pay close attention to the battery temperature while the charging takes place. If you have a peak charger, remove the pack immediately, and do not re-peak the pack over and over again.

**Addresses are listed alphabetically in the Index of Manufacturers on page 192. ■*

one on my RC10GT as it came out of a tight turn because I forgot to loosen the slipper after I had watered down the track.

Some ESCs have heavier gauge wire than others. Why?

Heavier gauge wire can handle more current. The measurement for wire is the American Wire Gauge (AWG). The smaller the AWG number, the larger the diameter of the wire. For example, 14AWG is



a larger wire than 16AWG and, therefore, can handle more current. Some ESCs can handle more current than others, so they need larger wires to handle the extra power. This allows you to use highly modified motors with some ESCs and not with others. Always check the specs before buying an ESC to see what it can handle.

Some of my friends use automobile brake cleaner on their cars and

motors. Is this OK?

No, not really. Some brake cleaners have extra nasty ingredients that can destroy paint, plastic, rubber and the epoxy that holds the armature's winding intact. Use



R/C electric motor spray instead. Although R/C motor sprays can eat some plastics, for the most part, they're pretty safe.



DuraTrax Spike

A REASONABLY priced, reliable ESC is always a welcome addition to the marketplace, so the compact, racing-style (no reverse) DuraTrax* Spike should be well-received.

With a price tag of \$39.95, the Spike seemed like a good deal, but would it also have low resistance and good performance?

SCOPING THE SPIKE

The heat sink is a one-piece affair that goes over the five forward FETs and the single brake FET. Normally, this arrangement would destroy a controller by generating a short between these two types of FETs, but the Spike's heat sink is electrically isolated in a silicone rubber boot. Silicone is a good conductor of heat and also a good insulator.

A conventional heat sink will

fit the Spike, but don't even think of using one because it will short out the FETs and destroy the unit completely.

It was time to open the case and look inside. (Don't try this!) The Spike's construction is very conventional, and its printed-circuit board is jam-packed. Obviously, its designer was trying for smallness. I noted the high-quality workmanship: shiny solder joints and heavy solder bridging around the FETs to help carry the heavy currents needed by a screaming R/C car.

While setting up the Spike for testing, I realized that it doesn't have a pulse-checking LED, so it's a little tricky to adjust. The instruction sheet tells you to: "Hold the transmitter at 90-percent throttle, and rotate the high-speed pot until the motor is at maximum rpm." I guess that you would do this by listening to the motor. Anyway, when setting up a controller on my workbench, I have an oscilloscope to check for full "on" operation.

LAB LABORS TEST 1— RESISTANCE

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading

helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• Voltage drop along the full length of the battery wires and motor wires: 0.41 volt—a resistance of 0.034 ohm.

• Voltage drop 2 inches along the battery wires and motor wires: 0.12 volt—a resistance of 0.01 ohm.

This second resistance reading is higher than those of some of the premium-price high-frequency ESCs on the market today, but it's lower than those of most of the reversing controllers that I have measured. And, for sure, it ain't shabby considering the price.

TEST 2— OVERHEATING

I check to see whether a controller can stand repeated battery-pack dumps without burning up. A 1500mAh battery pack will deliver 20 amps for about 4 minutes. With this in mind, I set the current level to 20 amps and ran the test for 15 minutes—equivalent to dumping four battery packs without a cool-down between them. I do run this test with the heat sinks in place, but I don't provide any cooling air from a fan. After 15 minutes, the heat sinks were very hot, but the controller was still operating normally.

TEST 3— HANDLING A SHORT

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a

gear jammed or the motor fried.

I placed a dead short across the motor leads (bare ends of the blue and white motor wires touching), connected the Spike to a fully charged 6-cell pack and jammed the throttle wide open. The current-meter jumped, the fuse popped, and the current dropped to zero. A fuse robs the motor of a little power, but it does protect your investment in the event of an overload. An overload can be caused by a variety of things, such as the aforementioned short, jammed gears, running in tall grass, or plugging the battery in backward.

But there's good news! When I removed the short and replaced the fuse with an inexpensive, 30A, automotive fuse, the Spike operated normally again.

SET THE SPIKE

The one-page instructions tell you all you need to know. With a full set of factory-installed connectors, almost any R/C car enthusiast should be able to install the Spike just by following the instructions. I installed it in my favorite fun vehicle—an MRC MT-10S truck.

In place of the mechanical controller, I installed an aluminum plate, which makes a good place to mount an ESC with servo tape. This places the ESC right in front of a hole in the rear shock tower, so lots of cooling air flows over its heat sink. With the Spike taped into place, I plugged in its receiver, battery and motor wires. My MRC MT-10S's motor already had a full set of capacitors, so I didn't install the ones that came with the Spike.



What it Has

- Forward with brakes—no reverse.
 - 6 FETs—5 for forward; 1 for brakes.
 - Built-in BEC.
 - Built-in 30A fuse.
 - Neutral and full-speed adjustment pots.
 - Large heat sink.
 - Full set of factory-installed connectors (Tamiya-style battery connectors and bullet-style motor connectors; Futaba J and Airtronics receiver plugs).
- And the usual instruction sheet, motor capacitors and adjustment screwdriver.



SPECIFICATIONS

DIMENSIONS

Height1.15 in.
 Width0.98 in.
 Length1.9 in.

WEIGHT

—with heat sink2.5 oz.

TUNING

Access to controlsGood
 Ease of adjustmentFair

LIST PRICE/

WARRANTY\$39.99/120 days

MANUFACTURER'S SPECS

Max. voltage7 cells
 Min. voltage5 cells
 Rated current150 amps
 Fuse current30 amps
 Resistance0.01 ohm

TEST PARAMETERS

Voltage6 volts
 Current12 amps

• Voltage drop

—along full length
 battery/motor wires0.41 volt
 —2 in. along wires0.12 volt

• Calculated resistance*

—along full length
 battery/motor wires0.034 ohm
 —2 in. along wires0.01 ohm

BEC output (6-cell pack)5.66 volts

*Resistance = voltage drop ÷ current

COMMENTS: light and small; truly for budget-conscious racers; its resistance isn't world-class low, but it's a great replacement for a mechanical controller; 5- to 7-cell capacity makes it great for local stock class racing.

I was then ready to match the Spike to my Futaba Magnum radio. This brought up two minor problems:

• There aren't any instructions for the proper transmitter settings. If you have a standard transmitter with few adjustments, just set all the throttle-trim potentiometers (pots) to their center position. If you have dual rates, endpoint adjustments and total throw adjustments, consult your transmitter's manual, and set all these functions to maximum throw. My transmitter allows me to set two-thirds of the trigger travel for forward and a third for brakes. This setting worked well with the Spike.

• There isn't a pulse-checking LED. Such an LED tells you whether the ESC is fully "on" when you squeeze the trigger to wide open. The instruction sheet does, however, tell you how to set up the Spike: first, prop up the chassis so that the driving wheels can turn freely. Next, connect the battery pack and turn on the transmitter and then the Spike's power switch. If, with the trigger in neu-

tral, the wheels start to turn, adjust the neutral trim pot until the motor stops running. The setting is right if the wheels start to turn when you barely touch the throttle. Next, pull the trigger to the 90-percent point, and adjust the full-speed pot until the motor is running at max rpm (you'll hear it). Holding my MRC MT-10S tightly to prevent it from running up my lap, I ran the adjustment pot through its range a few times to get a feel for its position with respect to the motor's sound. I selected a spot that appeared to produce full rpm (turning it farther did not increase rpm). I then checked the setup with my oscilloscope and found that the Spike was indeed matched to my transmitter. So, despite my misgivings, the instructions provided by DuraTrax worked.

TRUCK TEST

I charged up a few 6-cell battery packs and headed to the empty tennis court. (It was hot!) From the very first squeeze of the trigger, it was obvious that the Spike was a screamer. Its respectably low resistance means

good punch and good top speed. As always, my R/C car drew a crowd of youngsters. I let some of the older ones drive, and none had any difficulty.

At the end of every run, the motor and battery were very hot, but the Spike was just warm—a sure sign that it delivers a good dose of power to the motor for jammin' good performance.

Though the Spike is at the bottom of the price scale, it isn't at the bottom of the performance scale. Its smallness is a definite advantage. It won't quite operate down to four cells (five is the Spike's low end), but any car that sports a throttle servo and mechanical controller is a prime candidate for a Spike upgrade.

If you're being bit by the "I want to go racing bug," give the Spike a closer look. I plan to try mine out in our local track's box stock MRC MT-10S class.

*Addresses are listed alphabetically in the Index of Manufacturers on page 192. ■



Black Diamond—

- Alloy radio tray
- Alloy front bulkheads
- Alloy top front A-arms
- Quick-change front wheels
- Black-anodized alloy parts

Apollo Vari & 1/8 2WD—

- Fully adjustable ball diff

Excellent dealer program
Dealer inquiries welcome

Engine, header, pipe,
 air filter, fuel line, and
 radio not included.



Made in England along with most
 of the world's fastest racecars



Full parts and technical support provided by

Ja-Lea Co./DART Racing

401-B N. Interurban • Richardson, Texas 75081
 Phone (214) 238-0929 • Fax (214) 238-0965

Black Diamond
and Apollo Vari—

- Quick-change rear wheels
- Adjustable front caster
- Alloy rear bulkheads
- Adjustable front toe
- Adjustable rear toe
- Front anti-roll bar
- Oil-filled shocks
- Fully ball raced
- PB-Tec clutch
- Alloy rear arms
- DART Racing tires
- Rear anti-roll bar
- Machined 5mm chassis
- Powerful disk brakes
- Adjustable rear camber
- Adjustable front camber
- Fully adjustable ball diff

WHAT'S new



TEAM LOSI Entry-Level Double-X and Double-XT

These entry-level kits feature: the unique Double-X modular design; low-CG chassis; bushings instead of bearings; rigid suspension arms; aircraft-grade Allen-head hardware; anodized, oil-filled shocks with

powder-coated springs; turn-buckle linkage; 2.2-inch disk wheels and real racing tires; fully adjustable slipper/traction-control system; and the exclusive laydown transmission with a ball bearing on the input shaft and lubricant-impregnated bushings throughout.

The deluxe kit includes a 50/50 heavy-duty rheostat speed control with BEC plug and an 05 motor.

Part nos. and prices—A-0040, Double-X, deluxe, \$229.95; A-0041 Double-X, basic, \$209.95; A-0080 Double-XT, deluxe, \$239.95; A-0081, Double-XT, basic, \$219.95.

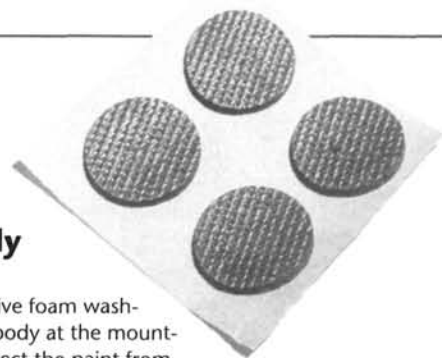
Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.

MOTOR MAN Foam Body Mounts

These self-adhesive foam washers cushion the body at the mounting holes to protect the paint from being scratched and prevent the body from rattling.

Part no.—MM2210; price—\$2.99.

Motor Man, distributed by Hobby Warehouse of Sacramento, 8950 Osage Ave., Sacramento, CA 95828; (916) 381-7491.

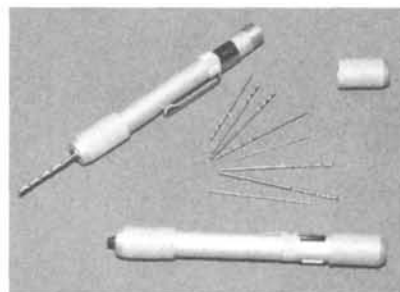


DAVIS MODEL PRODUCTS Pocket Drill Set

This tool easily drills holes in plastic, wood and soft metals. The uniquely designed hollow aluminum handle contains 12 steel drill bits that range in size from 0.014 inch to 0.062 inch. The pin vise locks the bits with a four-jaw steel collet. A protective coating on all exposed metal parts helps prevent corrosion and ensure a long, useful life.

Part no.—PDS-12; price—\$14.95.

Davis Model Products, P.O. Box 141, Dept. C, Milford, CT 06460; (203) 877-1670; fax (203) 876-2731.



KYOSHO SR-5 Race Truck

This electric 2WD race truck has a durable double-deck chassis; coil-spring front suspension; T-plate rear suspension with coil-spring friction damper; double-wishbone arms; 4-gear, bevel-type diff; and 48-pitch pinion



and spur gears. The kit includes pre-trued, medium-compound foam tires and a powerful 05 stock motor.

Part no.—KYOC0267; price—\$149.99

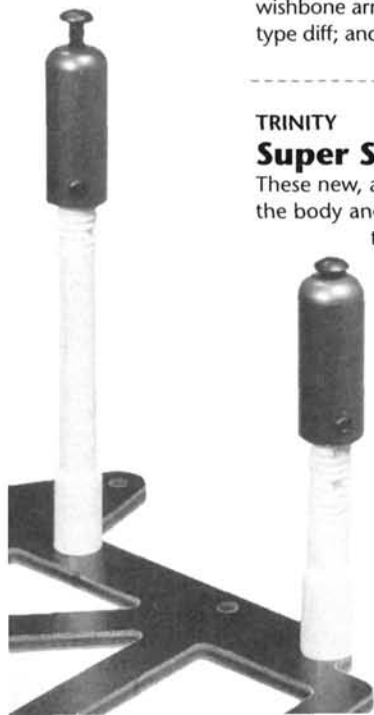
Kyosho; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

TRINITY Super Speedway Body Mounts

These new, adjustable mounts have a screw that secures the body and threaded body posts so that the light alloy top can be properly positioned. With these mounts, there is less aerodynamic drag and no need to use body clips. Every kit contains four pieces, in the correct sizes for stock cars.

Part nos. and prices—RC6041, Super Speedway Body Mounts (2-2 inch, 2-3 inch), \$11.99; RC6042, Replacement 2-inch Posts (4 pieces), \$2.99; RC6043, Replacement 3-inch Posts (4 pieces), \$3.99; RC6044, Replacement 4-inch Posts (4 pieces), \$3.99.

Trinity Products Inc., 1901 E. Linden Ave., #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



DYNAMITE Super Sport 1800

This battery pack uses Sanyo's performance-enhanced

1800 cells—their highest-capacity sub-C cells. An average cell tested at 1820mAh capacity, while typical voltages were 1.15 per cell. The pack features quadruple welded-tab construction, super-flex 14AWG silicone-insulated wire and molded end caps with wire relief. They're available in 6-cell flat packs with Tamiya connectors.

Part no.—DYN1100; price—\$42.95.

Dynamite, distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 355-8734.



TAMIYA

1/10-Scale Loctite Nissan Skyline GT-R N1

Featuring the TA02 4WD chassis, the injection-molded, tub-style frame of the GT-R N1 includes a set of long front arms as standard equipment. The realistic polycarbonate body has been accurately reproduced to include the V-spec base and bumper air duct and rear wing of its full-scale counterpart. The kit also includes a set of 5-spoke wheels with a 2mm wider offset, side mirrors, decals, window masking and a two-position rear wing.

Part no.—58155; price—\$265.

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; fax (714) 362-2250.



TRAXXAS Bandit

This full-blown, high-performance racing buggy features a channeled fiber/composite double-deck chassis; extra-long fiber/composite front arms; a centered kingpin and live front axles; bellcrank steering; large-bore high-volume shocks; and much more! It's available as a kit and in ready-to-run form. The RTR version includes Traxxas's high-power pistol-grip radio system. Both versions include a 540 motor and a rotary speed control.

Part nos. and prices—2401 (kit), \$150; 2410 (RTR), \$260.

Traxxas Corp., 12150 Shiloh Rd. #120, Dallas, TX 75228; (214) 613-3300; fax (214) 613-3599.



DAHM'S RACING BODIES

Rammer

This 0.030-inch-thick Lexan body was designed to be the lightest, best-looking, most aerodynamic and lowest stadium race truck body for the Associated RC10T2. The low-profile Rammer has a molded-in rear spoiler, narrow front area, sunroof escape hatch, roll bars, number plates, rear cooling vents and a small, raked driver's compartment. Complete instructions, grill and taillight decals and an optional rear spoiler are also included.

Part no.—D203; price—\$19.98.

Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931; (707) 792-1316; fax (707) 792-0137.



PARMA/PSE

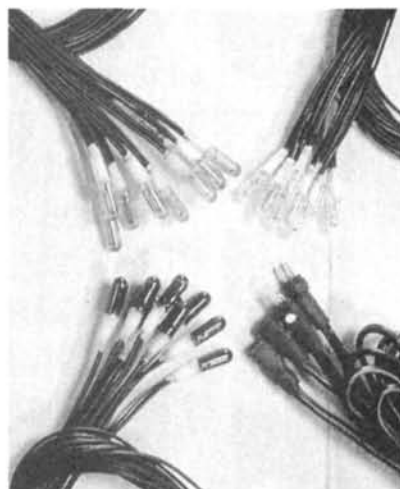
Team Spec II

This world-class modified motor has high-grade, heat-resistant wet magnets, a full ball bearing can and brush-hood heat sinks. The armature is hand-wound and Quillen X-100 balanced for maximum efficiency and performance. It's available in a wide range of winds for on- and off-road use.



Part nos.—14381, 10-turn double; 14382, 10-turn triple; 14383, 11-turn single; 14384, 11-turn double; 14385, 11-turn triple; 14386, 11-turn quad; 14387, 12-turn double; 14388, 13-turn single; 14389, 13-turn double; 14390, 13-turn triple; 14391, 15-turn triple; price—\$69.95.

Parma Intl. Inc., 13927 Progress Pkwy., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



MINIATURICS CORP.

Incandescent Lamps and Micro Mini Connectors

The white, 1.5V, 1.2mm, 15mA lamps have 8-inch wire leads. The 12V, 50mA red or green lamps are 2.4mm in diameter and also have 8-inch wire leads. These lamps can be used as headlights, sidelights and taillights.

The two-pin Micro Mini Connectors have a mated interlock assembly, firm fit and easy disconnect. They have 12-inch wires and are only 1/8 inch square.

Part nos and prices—18001-10, white (pack of 10), \$8.75; 18G12-10, green (pack of 10), \$9.95; 18R12, red (pack of 10), \$9.95; 50001-02, connectors (2 pairs), \$8.95.

Miniaturics Corp., 561-K Acorn St., Deer Park, NY 11729; (516) 242-MINI; fax (516) 242-7796.



SPECIFICATIONS

SCALE 1/8
LIST PRICE \$699.99

DIMENSIONS

Overall length 19.5 in.
Wheelbase 12.625 in.
Width (F/R) 11.875 in.

WEIGHT (gross, RTR) 7 lb., 2 oz.

CHASSIS

Type Stamped plate with 8-degree front kick-up
Material Duralumin



DRIVE TRAIN

Type Shaft-driven 4WD
Primary 13-tooth clutch bell/46-tooth spur
Transmission Front universal shafts/rear dogbones
Differential(s) (3) Mitre gear
Bearings/bushings Metal sealed ball bearings

SUSPENSION (F/R)

Type 4W independent w/lower arm and upper camber link
Damping Large-bore, oil-filled shocks

WHEELS (F/R)

Type One-piece molded 5-spoke
Dimensions (DxW) 3.125x1.5 in.

TIRES (F/R)

..... W-5648H hard-compound X-pattern

POWERPLANT
Engine O.S. RX-B .21
Pipe O.S. T-2010 tuned pipe
Carburetor O.S. slide

KYOSHO Inferno MP-5

by Frank Masi

DO YOURSELF A FAVOR, and look very closely at the car pictured in this article. It must be a slightly modified version of Kyosho's* Turbo Inferno, right? Wrong! It's Kyosho's all-new Inferno MP-5, and the only thing this 1/8-scale nitro buggy has in common with *any* previous Kyosho ride is its trick-looking blue shocks.

When they designed the MP-5, Kyosho started with two things: years of experience with 1/8-scale gas off-road racing and a blank sheet of paper. In fact, many of the MP-5's features—dare I say *groundbreaking* features for a 1/8-scale buggy—owe their existence to Kyosho's international racing programs. Top drivers from Europe, Asia and the U.S. offered their expertise in the development of the MP-5. The result is a car that is especially well-suited to bumpy surfaces, steers like a smaller electric buggy and is very easy to work on and tune.

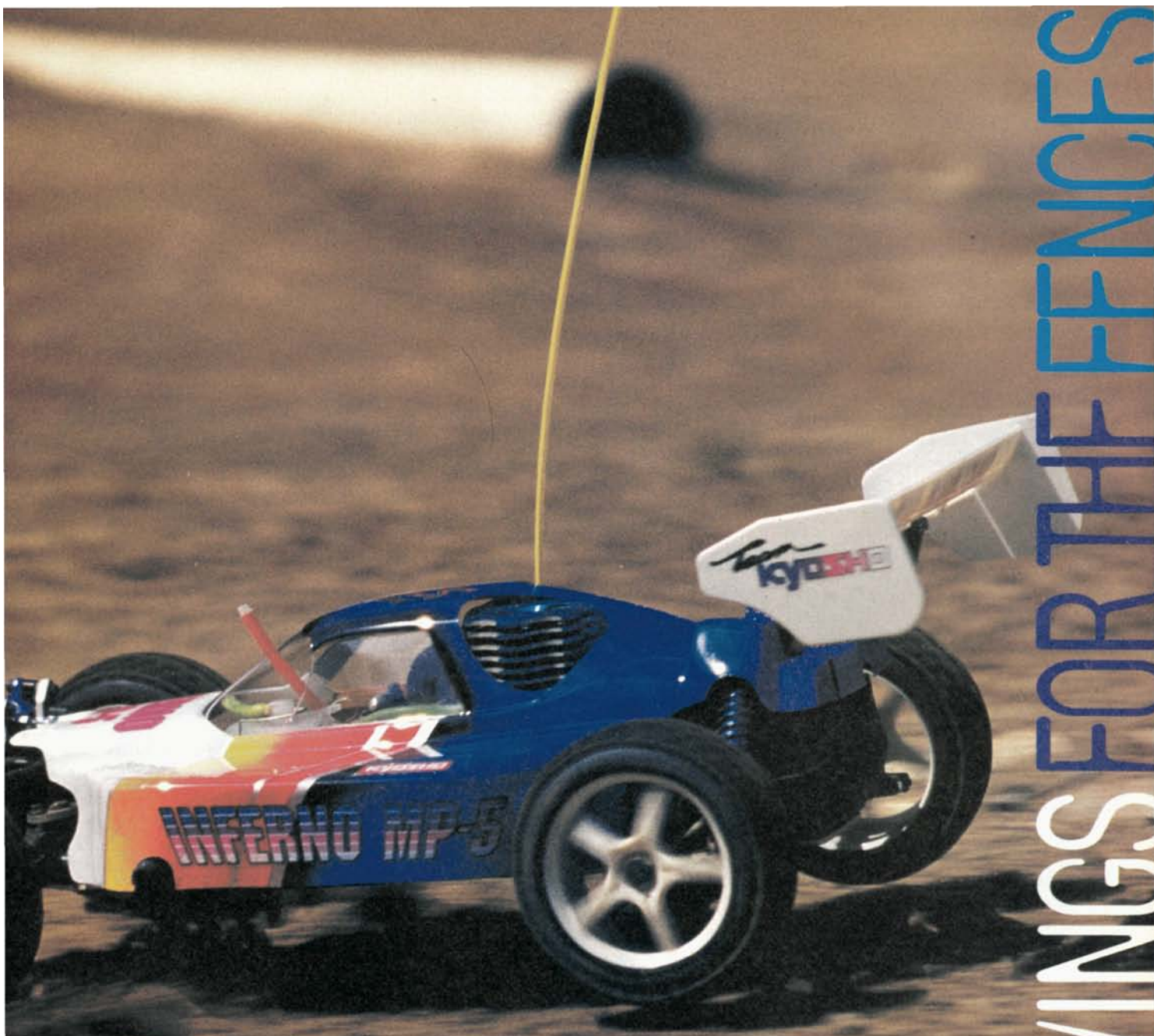
KIT FEATURES

The most significant feature of the MP-5 is its gold-anodized duralumin chassis. It's the first ever to have front kick-up (8 degrees). Chassis kick-up greatly improves the front suspension's ability to cope with rough tracks, and it prevents the front of the car from "digging in" when it lands off big jumps. Kick-up is a common design element of most 1/10-scale electric buggies, yet Kyosho is the first to incorporate this on a larger 1/8-scale buggy.

The MP-5 also has new suspension arms that are approximately 3/8 inch longer than those on the old Inferno. Although the MP-5's width is the same as that of the Inferno, the new car's suspension arms extend farther inside the wheels to provide better stability on bumpy tracks and a car that "floats" well over ruts.

Weight distribution and overall balance have also been improved on the MP-5. To minimize chassis lean during cornering and to improve the car's stability while jumping, designers moved the engine, the fuel tank and the radio gear more toward the chassis center line.

PHOTOS BY JOHN HOWELL



factory options

Kyosho offers dozens of hop-up options for the MP-5, so listing them all here would be difficult. Instead, I've highlighted those options that would most significantly add to the performance and durability of the car.

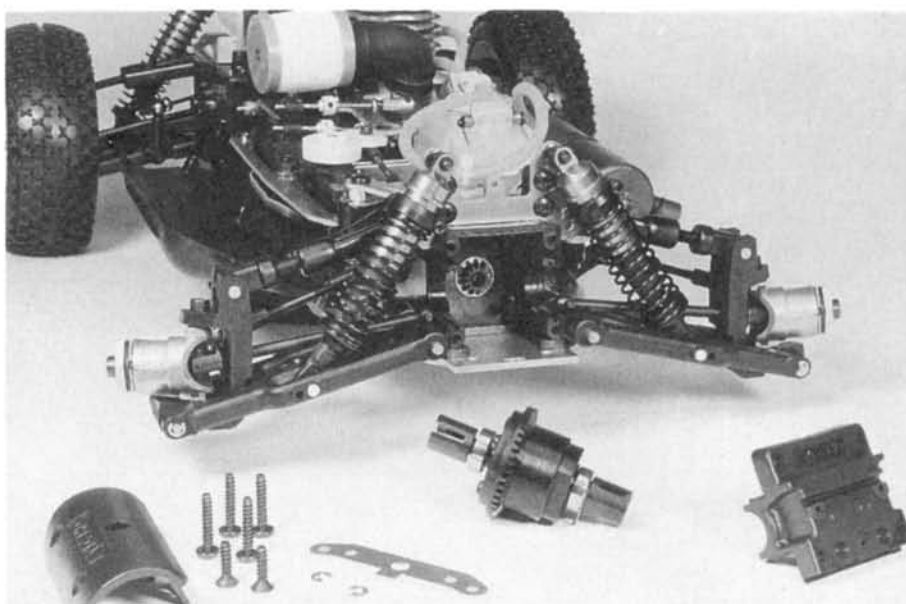
- **Special main chassis (IFW-1).** This chassis is thicker than the kit's and a little more rigid than stock.
- **46T steel main gear (IFW-3).** The molded main gear that comes with the kit really won't last long under strenuous racing conditions. This is one of the first modifications you should make.
- **Front stabilizer bar (IFW-5).** It takes away a little steering, but it keeps the chassis nice and flat during hard cornering.
- **Steel shock bushing (BSW-41).** These prevent the upper-shock mounting screws from being bent during collisions.
- **Special servo-saver (IFW-4).** Replaces the stock steering bellcranks. The bushings can be swapped for ball bearings for the ultimate in smooth steering.
- **Special disk plate (BSW-52).** Definitely get this option. It's a multiple, fiberglass disk-brake kit that provides two disks for the front and two for the rear of the center diff; it improves stopping power and durability.
- **Special radio post (BSW-54).** Purple-anodized aluminum posts that replace the molded posts that support the radio tray—much stronger than stock.

KYOSHO SWINGS FOR THE FENCES

INFERNO MP-5

In addition, all three differentials (front, rear and center) have smaller drive gears that enable the diffs to sit much closer to the chassis, and this gives the MP-5 a lower center of gravity and a lower rotational mass. Because the center differential is mounted lower, the drive shafts that connect the center diff to the front and rear gearboxes run at less of an angle to provide more efficient power transfer. Both the front and rear gearboxes have been extensively redesigned and are interchangeable so you can easily swap them from front to rear.

To save a little weight and prevent the diff's silicone oil from leaking, the front and rear diffs now have one-piece instead of three-piece bevel gears. The center diff has a one-piece endcap to which the molded, 46-tooth spur gear is attached. Even the diff output shafts received attention from Kyosho engineers. So that the shafts won't bind inside the diff hubs, they now have lit-



The design of the MP-5 provides easy access to the front and rear differentials. The diffs themselves now have smaller, one-piece bevel gears, which allow them to be mounted closer to the chassis for a lower center of gravity. The front and rear gearboxes are identical, so they can easily be interchanged.

Things You'll Need

■ 2-channel radio system ■ Fuel ■ Starter ■ Glow-plug igniter ■ .21 buggy engine, manifold and pipe

Building and Setup Tips

I've come to the conclusion that kits such as the MP-5 are simply not intended for first-time builders. The instruction manual, though packed with excellent illustrations, seems to be written with the assumption that you kinda know what you're doing—much more so than with smaller and less complicated electric buggy kits. Even Kyosho, with their reputation for clear and easy-to-follow instructions, omitted some of the basic information that beginners will need to build the MP-5 correctly. You should have some degree of experience with gas cars before you tackle a car such as the MP-5, or you should enlist the aid of someone who has experience.

To make the MP-5 live up to its full potential:

- First and foremost, on any gas-powered car, use thread-locking compound on all metal-to-metal connections, i.e., screws and nuts. If you don't, your car will literally shake itself apart.

- The MP-5's differentials are designed to be filled with thick silicone fluid; that's why they're sealed with O-rings. The thickness

of the oil and the amount you put in each diff will control the stiffness of the diff's action and how your MP-5 will handle. Purchase Kyosho's "super hard" silicone oil set (part no. 1956) from your dealer; it comes with 10,000, 30,000 and 50,000WT. I was disappointed to learn that the MP-5 doesn't come with silicone oil, which was standard in the Turbo Inferno.

To give my MP-5 tons of steering, I filled the rear differential completely with 30,000WT oil, the center diff about $\frac{3}{4}$ full with 30,000WT and the front diff about $\frac{1}{4}$ full with 20,000WT. Before you add the oil, lubricate the O-ring seals with Green Slime from RCPS*. This will greatly reduce the diff's friction and help to prevent the oil from leaking out. In a pinch, Noleen shock seal lubricant also works great. It's available at most motorcycle dealerships.

- When you install the front and rear diffs in their gear cases, take the time to add the correct number of shims to prevent excessive gear backlash. I ended up placing just one of the thick shims on each diff toward the side that's opposite the diff's drive gear.

Front Suspension

Shock pistons Stock, 1 hole
Shock oil Trinity* 60WT silicone
Spring Stock, kit springs
Shock mount Inner hole in suspension arm
Toe-in/out 1 degree toe-out
Camber 2 degrees negative
Camber link (inner) Top hole
Camber link (outer) Stock position

Rear Suspension

Shock pistons Stock, 1-hole
Shock oil Trinity 40WT
Spring Stock, kit springs
Shock mount Top, outer hole, bottom, middle hole in arm
Rear arm mount No. 1 block
Camber 2 degrees negative
Camber link (inner) Top, inner hole
Camber link (outer) Lower hole in hub carrier

Differentials

Front $\frac{1}{4}$ filled with 20,000WT silicone
Center $\frac{3}{4}$ filled with 30,000WT silicone
Rear Filled with 30,000WT silicone

Stabilizer bars

Front Not included
Rear Attached

Ride Height

Front Suspension arms level
Rear Suspension arms slightly above level

- Before you install the diffs, install the drive bevels and drive cups in the front and rear gearboxes. That way, you'll be able to tighten the cup to the shaft without excessive end play.

Likes

- Incredible amounts of steering.
- Chassis kick-up provides improved rough-track handling.
- Longer suspension arms provide a more "plush" ride on bumpy surfaces.
- Full range of chassis adjustments.
- Radio box protects your investment.
- Easy to work on.
- High-quality parts.

Dislikes

- Doesn't include silicone oil for diffs or foam inserts for the tires; the Turbo Inferno did.
- Because the plastic brake disks can melt during longer races, they should be replaced with fiberglass disks.

the grooves in them to retain lubricant.

Up front, the MP-5 has all-new steering geometry. The aluminum steering arms pivot on metal bushings instead of on screws. This allows the steering arms to pivot more freely, and the bushings are much stronger so you'll be less likely to snap the screws that secure the arms to the steering uprights. The steering arms also pivot at a 6-degree angle to the upright, so the front tires' contact patches are increased during hard cornering for more aggressive steering. For less slop and better steering geometry, the steering bellcranks now have a one-piece, aluminum drag link that replaces the two cumbersome tie rods used on the old Inferno.

For the radio tray, Kyosho designed a neat, molded box that protects your battery pack and receiver from moisture and crud. The box is large enough to hold most popular receivers and 5-cell receiver batteries. The hinged lid is held shut with a small body clip.

Another small improvement was made to the MP-5's dual-disk-brake linkage. The pushrods, which actuate the brakes, now move in unison. On the old Inferno, the

pushrods for the front and rear brake disks moved in opposite directions, which made setting up and adjusting the brakes more difficult. The new brake pushrods also feature small, knurled adjustment knobs so that you can quickly set the brake strength individually for each disk.

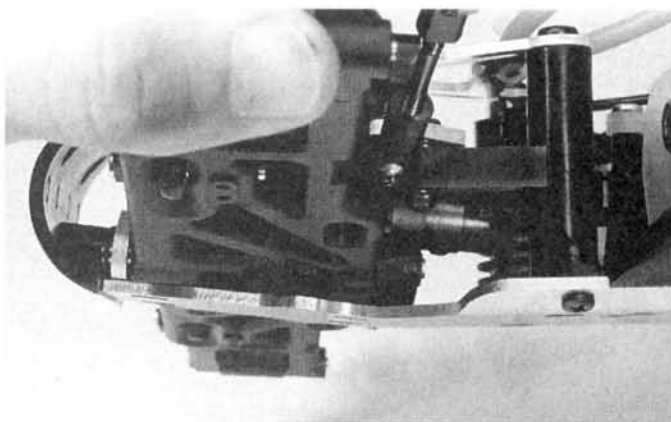
TEST GEAR

For this thrash test, I used an Airtronics*

Caliber 3Ps with 93327 27mHz receiver; two JR Remote Control* 2135 servos; O.S.* Max RX-B engine with T-2010 tuned pipe; large Kimbrough* servo-saver; Dynamite* 5-cell battery pack and colored fuel line.

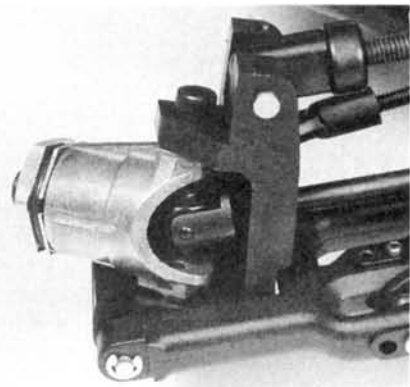
PERFORMANCE

With my Airtronics Caliber 3Ps and the Dynamite 5-cell receiver pack all charged and ready, and with a gallon of Byron's* 30-percent-nitro race fuel, I brought the

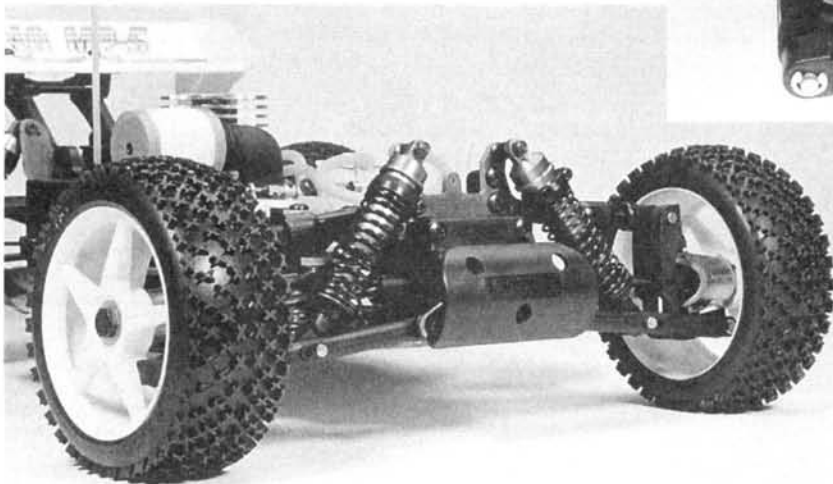


The MP-5's gold-anodized, duralumin chassis is the first to incorporate front kick-up, which enables the car to work better on bumpy tracks and prevents the front end from digging in after landing off a jump.

tried-and-true O.S. RX-B .21 engine sprang to life on the first try. I've had nothing but trouble-free performance from this engine,



The steering arms are supported by metal bushings for greater strength and less friction during operation. The steering arms also pivot at an angle of 6 degrees to the steering upright so that steering is improved during aggressive cornering.



Longer suspension arms are used at all four corners. They allow the car to really soak up the rough stuff. The kit-supplied X-pattern tires work well, but they don't include foam inserts.

MP-5 to the track at JP's Hobbies in Seymour, CT. Granted, this is a smaller track that's intended for 1/10-scale trucks and buggies but, in my opinion, if you can get a larger and faster 1/8-scale buggy around a tight track, you're dialed, dude!

I placed the MP-5 on a DuraTrax* starter box and bumped the engine's flywheel against the starter. As always, my

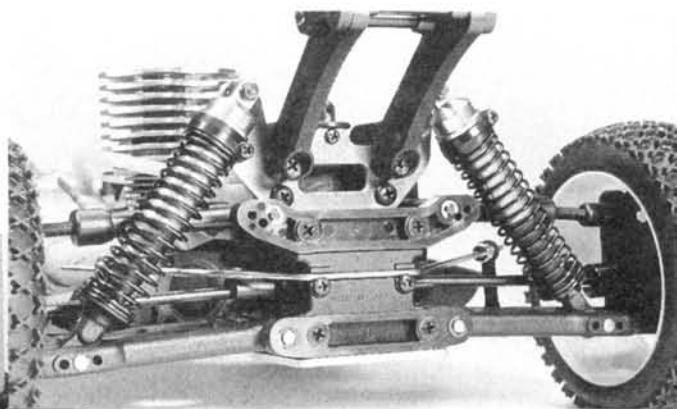
and although Kevin Hyatt at Great Planes had sent me a super-fast new O.S. RZ-B engine to test with the MP-5, I elected to stick to the RX-B for the initial runs. I'll test the RZ-B in my MP-5 later, after I've had time to properly break it in.

I dropped the MP-5 on the track and made a couple of slow laps to allow the engine to get up to operating temperature. After that, I blasted off. Acceleration was

INFERNO MP-5

phenomenal as I took off down the main straight, only to chop the throttle all too soon to make the first turn. The kit's X-pattern tires worked well on JP's hard-packed surface, especially after we watered the track a bit.

I've built and raced many 1/8-scale bug-



The rear suspension features lots of adjustments. You can change the upper camber link's position and the rear arm mount to one with a different amount of toe-in. Shock-angle and sway-bar stiffness can also be used to tune handling.

The MP-5's radio tray contains a molded box into which you place the receiver and its battery pack. With the lid closed, very little dirt and moisture can get in and possibly foul your expensive gear.

gies, so I instinctively used the brakes to slow the car enough so that it would steer around the tight turn. On subsequent laps, I found it unnecessary to use the brakes to make the turns with the MP-5. Instead, I let off on the throttle and pitched the car into the turns. The MP-5 has amazing steering. It really feels as if you're driving a 1/10-scale electric buggy through the tight turns.

The way my MP-5 was set up, the trade-off to all this steering was that it tended to oversteer or "hook" if I grabbed too much throttle coming out of a turn. To remedy

that followed a small sweeper turn at the far end of the track. The previous weekend, I'd raced my modified electric buggy, so I knew that this jump was difficult to clear. I didn't want to take the chance of breaking the MP-5 should I miss the jump, but the temptation was too great, and I went for it. I set up for the jump by going a little wide on the sweeper to build speed, and I punched the throttle. The MP-5 launched high into the air and sailed past the second jump. I mashed the brakes in midair, and that brought the MP-5 down to earth at a

performance .21 engines—even on tight tracks that have all-too-short straightaways.

FINAL THOUGHTS

Eighth-scale gas off-road racing isn't for everyone. The cars are larger and more complicated than electric buggies, and in most cases, gas cars cost significantly more. In my opinion, if you're serious about gas racing and you're willing to spend the money, there's no better car on the market than the new MP-5.

What you get for your investment is a state-of-the-art 1/8-scale off-road car with Kyosho's high-quality standards. With its long suspension arms, large-volume shocks and improved weight distribution, the MP-5 is perfectly suited to bumpy tracks. The kit's shortcomings are few: this is one of the most expensive cars on the market, so why doesn't it come with small items such as sil-

THE COMPETITION		OFNA ULTRA-GT	MUGEN ATHLETE	FLYING POINT JET PROBE	KYOSHO TURBO INFERNO	KYOSHO MP-5
	Wheelbase	13.0 in.	12.70 in.	12.75 in.	12.90 in.	12.625 in.
	Width	11.75 in.	12.00 in.	11.75 in.	11.9 in.	11.875 in.
	Weight	7lb., 8 oz.	7lb., 6 oz.	7lb., 8.5 oz.	7lb., 6.4 oz.	7 lb., 2 oz.
	Diff type	Planetary	Planetary	Planetary	Mitre	Mitre
	Brakes	Dual disk	Dual disk	Dual disk	Dual disk	Dual disk
	Exhaust	Tuned pipe	Not included	Header & pipe	Not included	Not included
	List price	\$499.00	\$649.99	\$595.00	\$679.95	\$699.99
	Available at*	\$299.00	\$439.99	\$369.99	\$499.99	\$549.99
	Issue reviewed	11/95	9/94	1/95	9/94	12/95

*Prices may vary with location.

this, you can switch to thinner silicone oil in the rear diff (perhaps to 20,000WT) or use thicker oil in the center diff. You could also use the no. 2 rear arm support, which would increase rear-wheel toe-in, and you could loosen the rear sway bar. Regardless, I prefer too much steering to not enough, so I left the MP-5 as it was.

After the fourth tank of fuel, I was so comfortable with the way the MP-5 handled that I decided to clear the double jump

slightly nose-down attitude. Surprisingly, the car's nose did not dig into the dirt; instead, it just kept on going, losing very little momentum. I attribute this to the chassis' front kick-up.

After about 10 tanks of fuel, it was time to pack it in for the day. Overall, I was impressed with the MP-5's handling; it goes where you want it to, and its poise and balance help you to control the considerable horsepower created by today's high-

icone oil for the diffs, high-performance brake disks and even oil for the shocks?

Otherwise, as a package, the MP-5 is fully race-ready. You shouldn't have to buy any hop-up parts other than the improved brake disks and the steel main gear. The Inferno and the Turbo Inferno are excellent cars, but the MP-5 sets new standards.

*Addresses are listed alphabetically in the Index of Manufacturers on page 192.

CAR ACTION
**THRASH
TEST**
1/10 SCALE ELECTRIC



SCALE 1/10
LIST PRICE \$267

DIMENSIONS

Length (overall) 18 in.
Wheelbase 10.1 in.
Width (F/R) 7 in.

WEIGHT (gross, RTR) 3 lb., 2 oz.

CHASSIS

Type Tub
Material Plastic

DRIVE TRAIN

Type Gear
Primary Pinion/spur
Transmission Gear
Differential(s) Ball/bevel gear
Slipper clutch None
Bearings/bushings Plastic bushings

SUSPENSION (F/R)

Type 4W, independent
w/fixed upper link
Damping Plastic oil-filled,
coil-overs

WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW) 2x1 in.

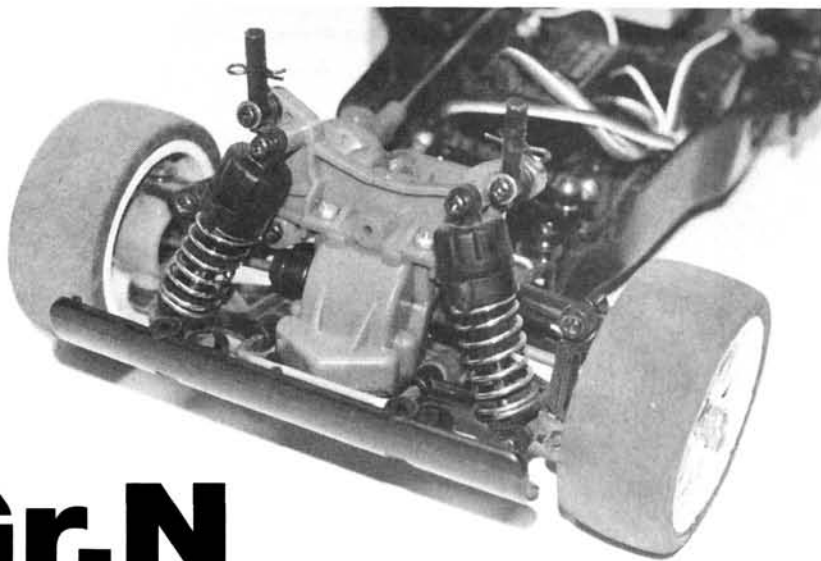
TIRES (F/R) Semi-pneumatic slicks

ELECTRICS

Motor Stock 540
Battery Not included
Speed Control Mechanical 3-step

SPECIFICATIONS

Tamiya Blitz Toyota Supra Gr.N

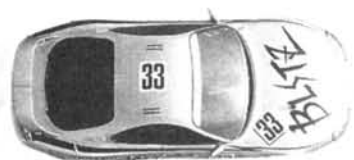


Up front—a set of reliable, plastic, coil-over, oil-filled shocks provide the damping. Slick rubber tires get the traction to the ground. Non-adjustable, fixed upper links don't allow caster and camber adjustments.

JUST WHEN YOU THINK you've seen all the 4WD on-road cars that Tamiya* has to offer, another pops up to join the crowd—introducing the Blitz Toyota Supra Gr.N! The full-size Toyota Supra is well-known for its high performance, great handling and awesome styling; the 1/10-scale Blitz from Tamiya shares these qualities.

Painting the Blitz's Lexan body is much easier with the supplied masking for the windows. Gone are the days of cutting 10 pieces of tape to cover a windshield! After spraying on several coats of silver, I backed it up with a coat of white. The mirrors and the spoiler really add detail, but the really sweet feature on this body is the chrome headlight reflectors. You night-

Silver Bullet Coupe



KIT FEATURES

The kit is relatively easy to put together thanks to the excellent assembly manual and high-quality parts. The Blitz is built around Tamiya's TA02 chassis, which features a forward battery mounting position for better weight distribution. For a more balanced chassis, the rear gearbox is mounted more forward than on Tamiya's TA01 chassis.

The 4W, independent-wishbone suspension system has an oil-filled, coil-over shock on each of the four corners. The shocks on the Blitz are plastic, but they work quite well. I filled mine with 30WT silicone oil instead of the supplied oil. If you want to shorten the shocks to lower the ride height, you must add spacers to the shock shaft before you insert it into the shock body. To adjust spring tension, various clip-on spacers are included in the kit.

The rear ball diff and front gear diff transmissions are housed in sealed gearboxes, which keep dirt out when you run the Blitz on unswept pavement. The diffs are also easily accessible for maintenance; simply remove four screws to take the diff out of the rear of the gearbox.

driving types can install bulbs in the pre-drilled holes in the reflectors.

Applying the decals is quite a chore; to achieve the best look possible, take your time and cut as close to the decal as you can. I chose to tint the windows because no interior or driver figure is provided. Painting the wheels silver is optional; if you want the real thing, aluminum wheels are available.

TEST GEAR

I used a Futaba* Attack R radio system to send the signal to a Futaba S148 steering servo and SCI* Viper ESC. I first tested the car with the stock motor, but then I switched to a Trinity* Green Machine 2 for a comparison run.

PERFORMANCE

My pack was charged and the car was ready. I took it out to a small parking lot that leads out to a not-so-busy street near my house. The stock motor's speeds weren't blinding, but run times were lengthy. I couldn't get the car to spin out no matter what I tried. Steering response was excellent, and chassis roll was

FACTORY OPTIONS

- Ball bearings—no. 53167.
- Headlight kit—50320.
- Aluminum wheels—53131 or 53140.
- Body parts set—50536.

THINGS YOU'LL NEED

- Radio gear and steering servo
- Battery pack
- Battery charger
- Paint for body

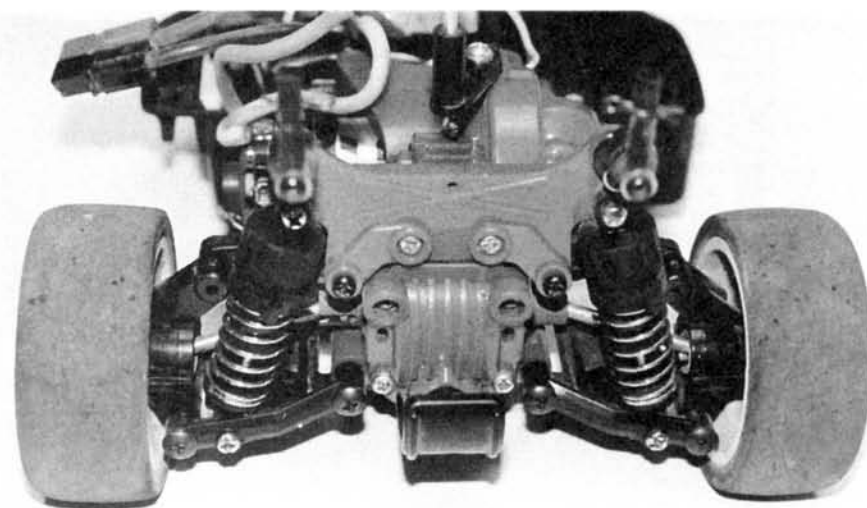
BUILDING & SETUP TIPS

• Step one is probably the most difficult—building the ball differential. Be especially aware of the direction in which you install the concave “disk springs.” If they aren’t positioned correctly, you’ll never get the diff to tighten up. If you don’t do it right the first time, simply remove four screws to take the diff out of the rear of the gearbox.

• When you build the kit for the first time, it’s a good idea to install bearings. If you don’t have enough for the whole car, at least install enough for the front and rear gearboxes. I found that the uprights required bigger bearings. You can order bearings directly from your local hobby shop or Tamiya. For the front uprights, you’ll need two 12x6 ball bearings (part no. 53065) and two 15x10 other pieces (no. 53126).

• Before you install the propeller shaft, remove the plastic cups from the front and rear gearboxes and replace them with 1-inch sections of fuel tubing. This will stop the wobbling and noise that stock cups make.

• After running the Blitz for a while, I noticed a lot of wear on the outside edges of the tires. I believe that the sidewall of the tire gets rolled over and underneath the tires’ contact patch. Foam inserts should help to firm the tire up and prevent this from happening.



Out back—the same plastic, coil-over, oil-filled shocks. As with the front setup, fixed upper links also keep the caster and camber at a constant setting, which is perfect for the TA02 chassis.

minimal. Later, I found some dusty patches that gave me some exciting sliding action.

After this run, I wanted to see how the car would handle with a faster motor, so I installed a Green Machine 2. My Dad has a

Tamiya includes a ball differential in the rear, and a gear diff standard equip up front.



likes



- Awesome detailing.
- Excellent handling.
- Easy maintenance.

dislikes



- Limited pinion selection.
- The 540 motor is a bit too slow for racing.

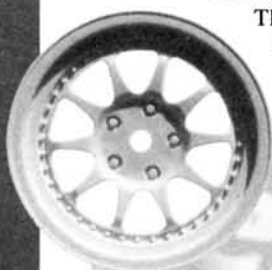
Tamiya Mercedes 190E equipped with a Green Machine 2, so I asked him to race. We were evenly matched and spent the afternoon racing in an oval configuration on the street. What a blast!

The Blitz was definitely designed for close competition.

FINAL THOUGHTS

I plan to add a few options including headlights, radial tires and aluminum spoke wheels. But, right out of the box, the Blitz is a definite winner. I managed to smoke my Dad...he just couldn’t catch me.

* Addresses are listed alphabetically in the Index of Manufacturers on page 192. ■

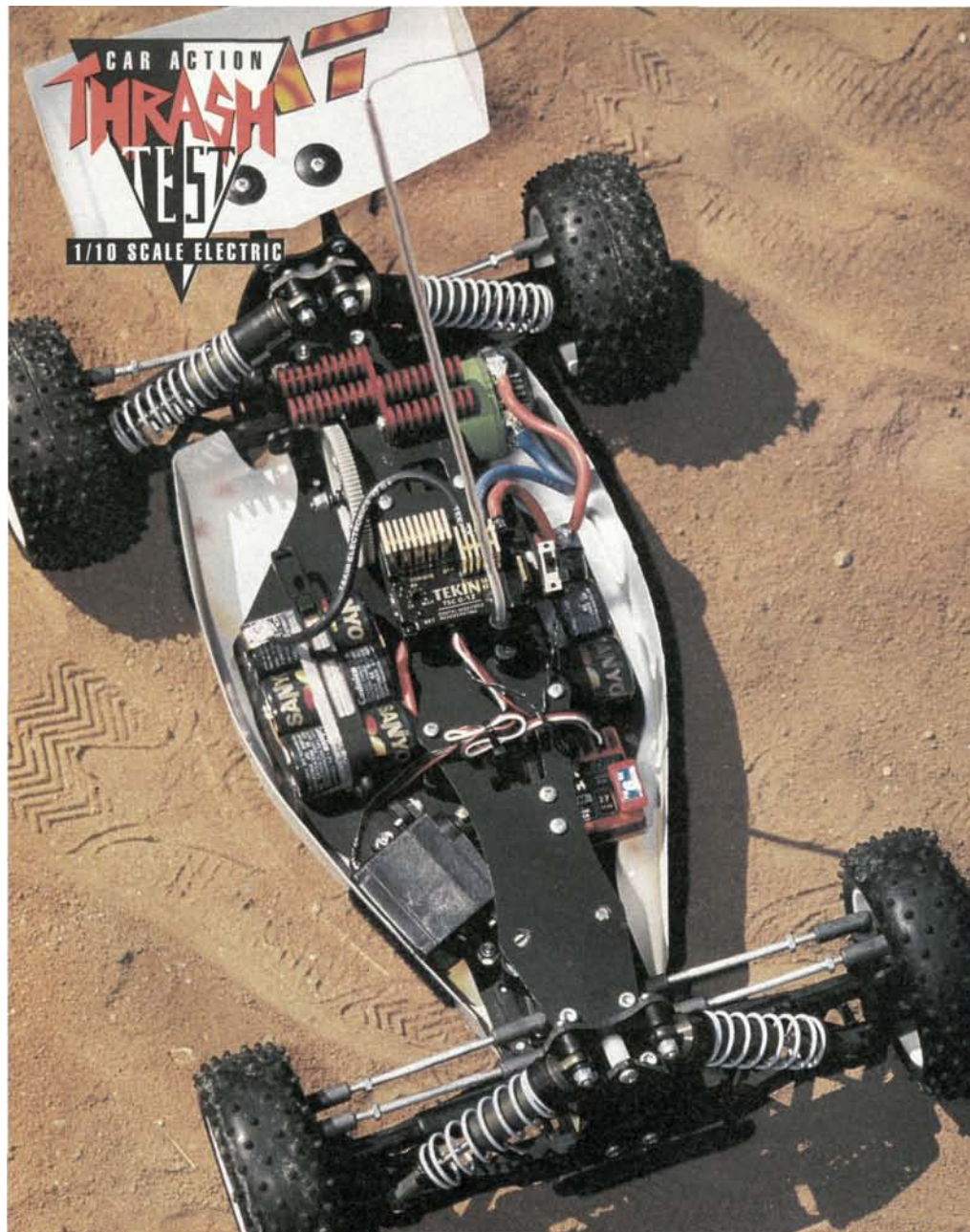


THE COMPETITION

	Kyosho Spider	Yokomo YR-4	Tamiya Blitz Toyota Supra	Schumacher Bosscat 4WD
Wheelbase	10.25 in.	10.25 in.	10.1 in.	10.75 in.
Width (F/R)	7.5 in./7.75 in.	7.13 in.	7 in.	9.21 in./9.45 in.
Weight	3 lb., 4.1 oz.	3 lb., 3 oz.	3 lb., 2 oz.	3 lb., 10 oz.
Diff type	Gear	Ball	Ball	Ball
Chassis	Aluminum	Black fiberglass	Plastic	Fiberglass
List price	\$219.99	\$269	\$267	\$249.50
Available at*	\$159.99	\$209.95	\$149.99	\$194.95
Reviewed in	8/95**	8/94	12/95	8/95**

*Prices vary with location.

**See “The Great Big Sedan Slam.”



CAR ACTION
THRASH
TEST
 1/10 SCALE ELECTRIC

PERFORMANCE SPECIFICATIONS	SCALE	1/10
	LIST PRICE	\$529.50
	DIMENSIONS	
	Length (overall).....	16.5 in.
	Width	9.5 in.
	Wheelbase	11 in.
	Track (F/R).....	9.5 in.
	WEIGHT	
	(gross, with batteries)	3 lb., 6 oz.
	CHASSIS	
	Type	Dual-deck
	Material	Fiberglass
	DRIVE TRAIN	
	Type.....	Belt
	Primary Differential(s)	2 ball-type
	Bearings/bushings	Bearings
	SUSPENSION (F/R)	
	Type	Independent wishbone
	Damping	Coil-over oil shocks
	WHEELS	
	Type	Schumacher 3-spoke
	Dimensions (DxW)	
	—Front.....	3 3/8 x 1 1/4 in.
	—Rear	3 3/8 x 1 1/2 in.
	TIRES (F/R)	Schumacher green compound 2.2 mini-spike
	ELECTRICS	Not included

Things You'll Need

- Radio gear
- ESC
- Battery pack
- Motor
- Paint for body

This updated 4WD buggy will give the competition a run for its money!



Schumacher Cat 2000 EC

by JIM KNEPLEY

WHEN I STARTED racing novice class, I raced a Kyosho* Turbo Optima Mid SE; in fact, it's still on my shelf, waiting to be converted for parking-lot racing. When I graduated from the novice class, I needed a good 2WD car. The Turbo Optima Mid SE was outdated, and people just weren't racing 4WD stock. It's difficult to find 4WD racing anymore—stock or modified. That's the bad news.

The good news is that, at big events, 4WD cars are making a comeback. The Yokomo* YZ-10 is perhaps the most visible 4WD buggy, having won four consecutive IFMAR World Championships, but now there's another name to watch—Schumacher*. The already impressive Cat 2000 has been upgraded to the Cat 2000 Euro Champ version (popularly known as the Cat 2000 EC), and it's based on the 1994 Euro Champs winner. The kit is now available through hobby shops and direct from Schumacher USA for \$329 (part no. U498).

KIT FEATURES

The Cat 2000 has a dual-belt design with twin fiberglass decks for a rigid but incred-

ibly light chassis. Schumacher's telescopic drive shafts transfer power from the front and rear pre-assembled differentials to the wheels. The stock tires are Schumacher's green-compound mini-pins—best suited to soft, high-bite dirt. Schumacher makes a wide variety of treads and compounds to fit most track conditions, but other manufacturer's tires also work well.

A friction slipper clutch borrowed from the other cars in the 2000 Series regulates power from the motor. In most cases, the stock clutch is all you'll need. A Viscous Drive Coupling (VDC) that functions like the Losi* Hydra Drive is also available. The VDC works like a "real" viscous drive, with two plates that run on a film of oil and create friction. The distance between the plates is adjustable for precise tuning. To prevent oil from leaking, O-rings seal the aluminum housing. An independently adjustable slipper clutch is also integral to the unit. Best of all, it's very light, which equals low rotating mass and fast acceleration.

The kit comes with Schumacher's tunable Pro shocks. These hardened-aluminum units deliver commendable performance that's on a par with Associated* and Losi top-level shocks. The dampers inside the shocks are interesting; they can be quickly adjusted from four holes to one hole with just a twist. This setup saves time during tuning because you can do a quick damping change without ripping apart the piston assembly or changing the oil.

The usual parts are also included: full ball bearings (14 in all), adjustable turnbuckles, a 95-tooth, 48-pitch spur gear, 3-spoke wheels and a cool Lexan body shell with an undertray.

I've heard complaints from Storm 2000 owners that the assembly instructions are difficult to follow—not so with the Cat 2000 EC. The instructions are clear and concise.

Factory Options

Here are some of the available upgrades:

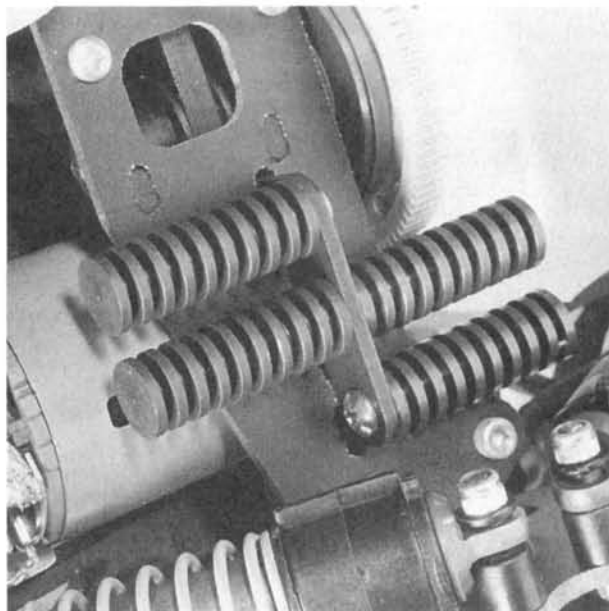
- A nearly indestructible plastic Molded Flex Wing replaces the Lexan wing. This wing is very similar in design and material to Associated plastic wings—U5041.
- Roller one-way conversion—a hard-coated alloy front pulley with one-way bearing and hardened slipper shaft. This assembly replaces the ratchet assembly that comes stock with the car—U1528.
- Alloy rear transmission lower housing and motor mount—U1563.
- Alloy front transmission lower housing—U1745.
- Carbon-fiber chassis, upper chassis and shock mounts—U1794, U1795, U1805, U1806.
- Wide front bumper—added protection for the front end—U1566.
- Schumacher sells Lunsford* titanium tie rods and hinge pins for all their cars—L002 through L020.
- The Viscous Drive Unit requires a new layshaft to operate but is a must for very rough surfaces. VDU—U1787; layshaft—U1788.

likes

- The chassis and shock towers are extremely rigid and light.
- Stock tie rods and ball ends are remarkably durable.
- Outstanding steering agility.
- The batteries are held in very tightly.
- Very light for a 4WD car. At 3 pounds, 6 ounces, it's lighter than a Losi Double-X.
- It's fun to drive.

dislikes

- Not as adjustable as previous Schumacher cars.
- There's no good place to put the ESC switch on the outside of the body.
- Three pounds, 6 ounces is 2 ounces underweight. To be legal, ROAR racers will have to add weight.
- The speed-control tray has to be moved to change motors.



The motor heat sink draws heat away from the motor, but even with it, mine was pretty warm.

Building & Setup Tips

The parts fit is mostly very good—not too tight, not too loose. Some of the screws fit snugly, ensuring that they won't fall out under stress. Keep a file handy to smooth down the fiberglass parts. A utility knife is also useful for removing flashing from molded parts. You'll need pliers to put on the new, very tight-fitting material used for the ball ends.

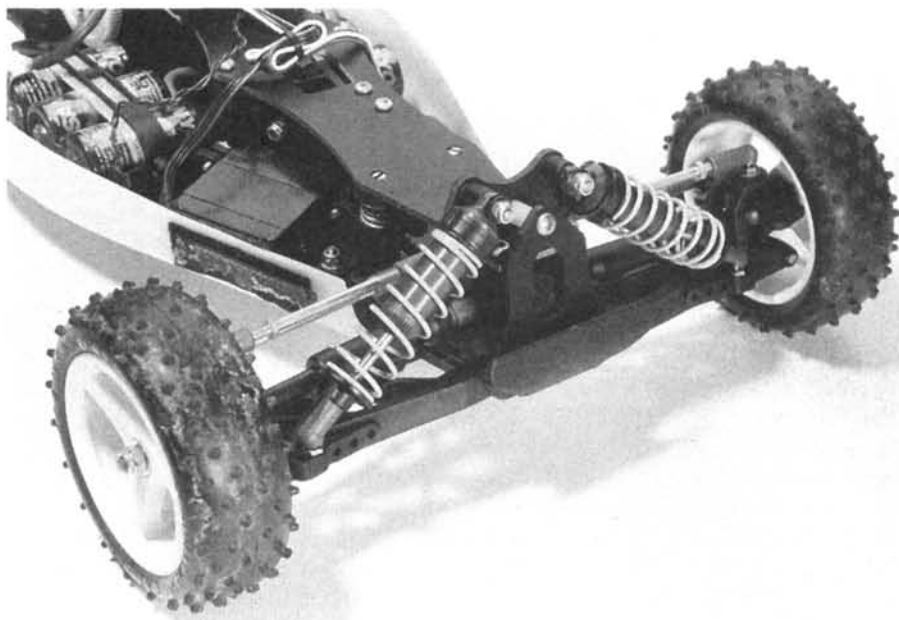
The Ackerman link is especially long, so keep the front differential in good shape (you should anyway), or you'll lose steering. The belt tension adjustment is odd, but effective. Once during assembly, I thought, "This doesn't look right." I thought that Schumacher had sent screws of the wrong length. I discovered that the steering assembly is made more rigid because the screws that support the steering arms go into the bottom chassis plate!

Cut a hole in the body for ventilation. The stock motor heat sinks keep heat away from the motor for a while, but it will still come off the track pretty warm without additional airflow.

Anti-Squat Adjustment

Adjusting anti-squat makes the rear of the car more stable in turns (so-called "side bite" is increased). The upshot of this is increased power out of turns. Adjusting the anti-squat is easy to do and is a popular way to get more rear traction. Schumacher tells me that increasing the anti-squat on the Cat has profound effects, although my test vehicle didn't need more rear bite. Keep in mind that you will be cutting parts, so be careful.

The stock anti-squat is 1.4 degrees. It can be changed to 5 degrees by cutting down the back flange, so it's flush against the surface of the suspension mount, but this is usually a bad idea, because you tend to lose steering. By raising the back end slightly with thin (0.5mm) washers, you can adjust the anti-squat to 2 (3mm washers), 3 (2mm washers), or 4 degrees (1mm washer). Team drivers frequently use 3 degrees.



The shocks are inclined more than on the older Cat 2000 design. This is the most major update on the car.

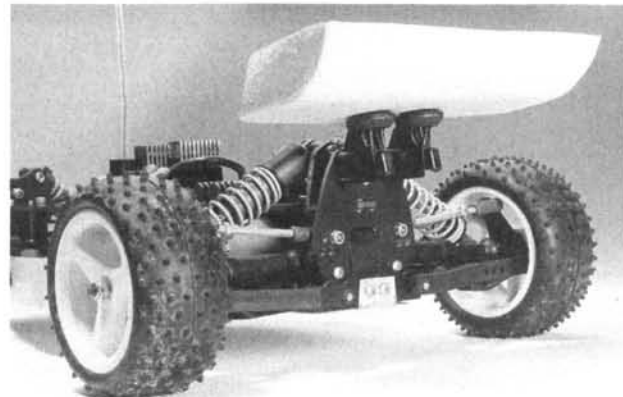
Assembly is straightforward but does require patience and a steady hand.

A new stiffer, plastic material is used for the suspension arms. Older Cougar 2000 cars sometimes had a problem with the rear arms flexing and the universal joint becoming disengaged. Since I've been using the new arms in my Cougar 2000 '95 Team, I

haven't had a universal come out. The speed-control tray is certainly a nice touch but, for my tastes, it's in the wrong place.

Aside from the pinion and spur, there are no gears in the Cat 2000—only pulleys. The motor drives a center pulley and two Kevlar belts deliver power to the front and rear pulleys at a ratio of exactly 2:1.

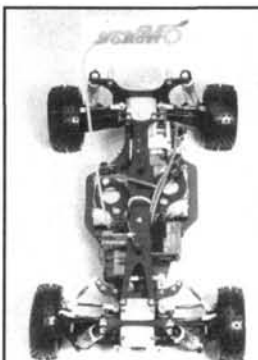
Belt clearance is tight in some areas, so inexperienced builders should make sure that the belts don't rub. The center pulley incorporates a ratchet-style, one-way assembly. If you'd prefer to use conventional one-way bearings for the front wheels, Schumacher offers a high-performance, aluminum-alloy pulley with a one-way bearing.



The rear wing is attached with O-rings, allowing some flex as shown here. This is typical of the 2000 Series. Schumacher's sliding drive shafts are capped and sealed with two O-rings for long life. They are also totally rebuildable.

TEST GEAR

For this top-of-the-line vehicle, I chose top-of-



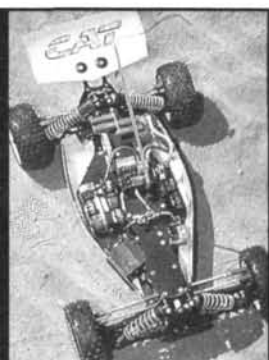
THE COMPETITION

YOKOMO YZ-10

SCHUMACHER Cat 2000 EC

Wheelbase	10.5 in.	11 in.
Width	9.67 in.	9.5 in.
Weight	3.64 lb.	3 lb., 6 oz.
Diff type	Ball	Ball
Chassis	Carbon-fiber	Fiberglass
Price	\$398	\$529.50
Available at*	\$344.95	\$329.95
Issue reviewed	9/94	12/95

*Prices vary with location.



the-line electric gear. A JR* R-756 powers signals to a Novak* NER-3FM receiver. An Airtronics* 94151 handles the steering duties, and a Tekin* G-12 moves power from World Class* high-output SCRC packs to an Extreme Motorsports* Smoke II motor. To start, I guessed at gearing, putting it halfway between my buggy and my truck.

PERFORMANCE

I peaked a battery and then I went off to the track to kick up some dirt. I had run a few weeks before on this outdoor monster, so I was able to compare the Cat to my Cougar 2000 and Storm 2000. I was running an untested setup and bone stock hardware, so I didn't expect much. But man oh man, was I surprised!

There's a distinct "feel" to properly adjusted cars in the 2000 Series. The setup that came with the kit was excellent. The Cat handled more like my Cougar than my Storm (not a surprise), but it had something more—power! If you've never driven a 4WD car, you won't appreciate how you can "get on" the throttle out of turns. I literally slammed the throttle wide open just as the car pointed in the right direction, and it took off like a shot. Try that with a 2WD car and, unless your slipper is loose, you'll probably lose control. It was explained to me that such cornering is typical of 4WD cars, so I wanted to know how the Cat would stack up against a Yokomo.

Because I had never raced competitive 4WD, I asked one of the drivers who usually drives a YZ-10 to take a few laps with my car. His comments were, "This has a more predictable steering than the YZ-10 and better rear traction. Make the shocks stiffer and raise the front end, and you've got a winner." After the pack died, he commented that he would have done better at the Stock Nationals if he had had a Cat—high praise, indeed!

FINAL THOUGHTS

Things go in cycles. For a long time, Yokomo has dominated 4WD off-road; the Yokomo YZ-10 has been taking most of the victory laps lately. But get ready to see a new name at the top. Schumacher's Cat 2000 Euro Champ is not only easy to drive, fast and durable, but it's also actually fun to race. "Here kitty, kitty!"

* Addresses are listed alphabetically in the Index of Manufacturers on page 192.

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Buy Five or More Bodies
for \$11.95 Each

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- #127 1/10 T-Bird Stocker Wide
- #170 1/10 T-Bird Stocker Narrow
- #141 1/10 Olds Stocker Wide
- #162 1/10 Olds Stocker Narrow

- #168 1/10 Short Track Stocker Narrow
- #144 1/10 Short Track Stocker Wide

- #135 1/10 Ford Monster Truck
- #153 1/10 Iron Man Toyota Desert Racer
- #165 1/10 Dakota "T"
- #145 1/10 '48 Ford Panel Truck
- #128 1/10 Nissan Racing Mini Pickup
- #135 1/10 Ford Pickup
- #146 1/10 Nissan GTP-NPT 90
- #127 1/10 Penske Indy
- #132 1/10 Nissan 300Z
- #143 1/10 Beretta Pro Stock W/Wing
- #164 1/10 Olds Pro Stock Narrow
- #129 1/10 Street Rod Coupe
- #134 1/10 '70 Barracuda
- #136 1/10 '70 Boss Mustang
- #142 1/10 El Camino
- #160 1/10 Corvette ZR-1
- #158 1/10 '51 Merc Cruiser

- #219 Flame Decals
- #221 Super Speedway Decals (\$2.49)
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(Comes clear with clock mechanism included)

NEW PRODUCT WATCH

KYOSHO *Active* Steering Sensor

by John Huber

Steer Clear



The Active Steering Sensor is small and light enough to be mounted on any type of R/C car. I mounted this unit on my 4WD Tamiya sedan's rear gearbox.

WHAT USE CAN a gyro be in your R/C car? Well, in a helicopter, a gyro is used as a stabilizing device to keep the rear end of the 'copter from swapping with the front end. Hey! That sounds like a problem some cars have—swapping ends.

HOW A GYRO WORKS

For a long time, the gyros in helicopters had moving internal parts. A weighted flywheel spun at high speeds inside the gyro case when the unit was turned on. Once the fly-

wheel was up to speed, sensors monitored its attitude. Any slight movement of the 'copter's tail was detected in the gyro, and the appropriate command was sent to the tail-rotor servo to counter the rotation.

While this type of gyro works well, there are some problems. First of all, the spinning flywheel needs a decent amount of power to keep spinning. To keep from draining the radio system battery too quickly, most gyros use a separate battery pack to power them, but this adds weight. The other problem is common to anything with moving parts:

they wear out, or simply get damaged.

Imagine the force of a helicopter crashing to the ground. Now imagine the intricate gyro being exposed to this type of force.

New technology has emerged over the last couple of years, and there are now piezoelectric gyros that have no moving internal parts. Without a spinning flywheel, power consumption has dropped dramatically and so has the size of the unit itself. These new gyros also have a faster response. Smaller, lighter gyros have now become usable in cars. Enter the Kyosho* Active Steering Sensor (A.S.S.).

TESTING

I decided to give the new Kyosho Active Steering Sensor a try to see if it really helps on a car. The first vehicle I tried it in was a Tamiya 4WD sedan. Installing the gyro is very easy: just mount the unit on a flat surface of the chassis with foam tape. Plug the gyro between the steering servo and the receiver, and you are ready to go. For electric cars with a BEC system, Kyosho recommends a separate 6V pack to power the gyro, because the BEC voltage can change during a run. The gyro has a couple of adjustments on the top that adjust the servo direction and the amount of change the gyro will have on the steering. There is also a pair of endpoint pots to adjust the throw of the servo in each direction.

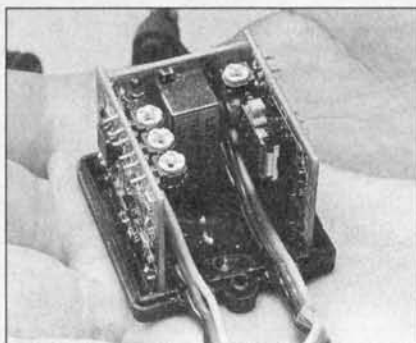
Once the unit had been installed and adjusted, I turned everything on. Leaving the transmitter on the table, I picked up the chassis and began to simulate a slide by turning the rear of the car from side to side.

As I did this, the servo countered my movements exactly. As fast as I could move the chassis, the servo countered the movement by turning the wheels so that they pointed in the direction of the slide. Then it was time to go outside and test it.

I began to crank around the street to see how well it worked. The problem I encountered was the 4WD car never slid a bit, so I couldn't see the effect of the gyro. I called Great Planes (Kyosho's distributor) and got a little info on the unit from their R&D guys.

I was told there are some places it will work well and others it

doesn't. It will help about 80 percent of the time, but it can be a problem the other 20 percent. Basically, you need to change your driving style a bit to get it to work well. For the most part, 4WD cars do not have the same sliding characteristics as 2WD cars. For this



Inside this incredibly small unit are three circuit boards. The ceramic gyro is the small metal box on the center circuit board.

reason, 2WD cars seem better suited to the A.S.S. than 4WD cars. The main benefits of the system seem to be in acceleration and braking. As the rear wheels light up on an off-road buggy, the rear end of the car can slide to either side. The A.S.S. keeps the wheels pointing straight ahead and counters any fish-tailing tendency. Again, under braking, the A.S.S. keeps the rear end in check and allows perfectly straight stopping. The problem of the system comes into play when you want to slide the rear around. If you come into a sharp turn and try to lock the brakes to slide the rear around, the A.S.S. counters the slide and sends the car towards the wall.

Basically, it requires that you learn a different driving style that takes getting used to.

It seems as if the best use for the A.S.S. would be in 2WD on-road cars, both gas and electric, and in any scale from 1/10 to 1/4. It also might help keep dragsters on the straight and narrow. The only problem I see with the unit is its price; its list price is \$249.99, but it can be found for about \$190. This is too steep for most racers, but it might be worth it for people with expensive gas and 1/4-scale cars. Get your A.S.S. in gear!

*Addresses are listed alphabetically in the Index of Manufacturers on page 192. ■

PHOTOS BY WALTER SIDAS

1995

日本

IFMAR

BY GEORGE M. GONZALEZ

1/10
scale
electric

OFF-ROAD

WORLD CHAMPIONSHIPS

EVERY TWO YEARS, the International Federation of Model Auto Racing (IFMAR) organizes the 1/10-Scale Electric Off-Road World Championships—this time held at Tsukuba City, Ibaraki, Japan—and two world champions are crowned. In the U.S., the 2WD World Championship title is by far the most respected one a driver could possibly earn; it denotes a level of excellence that overshadows any other off-road title on the planet.

The 4WD World Championship has more of a "global" appeal and is particularly popular in Europe and Japan (no U.S. company manufactures a 1/10-scale 4WD off-road car). The companies that manufacture the winning car and the racing gear used earn valuable boasting rights that can't be matched by winning any other racing event. It also attracts the world's best off-road racers from countries such as the U.S., Japan, New Zealand, South Africa, Greece, the United Kingdom, Finland, France and Spain (to name just a few). Many travel thousands of miles to participate, but the titles can't be won by just ordinary R/C racers; only the best drivers can compete.

U.S. Drivers steal t

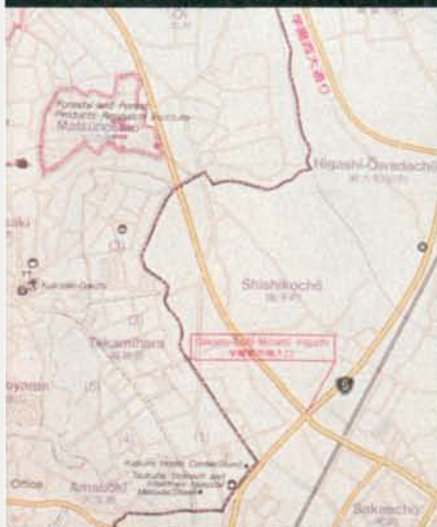
Every participating country's sanctioning organization has 40 slots to fill, and they all follow their own set of qualifying rules. The USA's sanctioning body is Radio Operated Auto Racing (ROAR), and most of the available slots are filled by the top finishers at the ROAR 2WD and 4WD Nationals. In Europe, the European Federation of Radio Operated Automobiles (EFRA) fills their slots with the top finalists from the European Championships. The Far East Model Car Association (FEMCA) also sends finalists from their most recent championships. A fourth sanctioning organization—the Fourth Association of Model Auto Racing (FAMAR)—is allocated 10 slots for their

PHOTOS BY GEORGE GONZALEZ

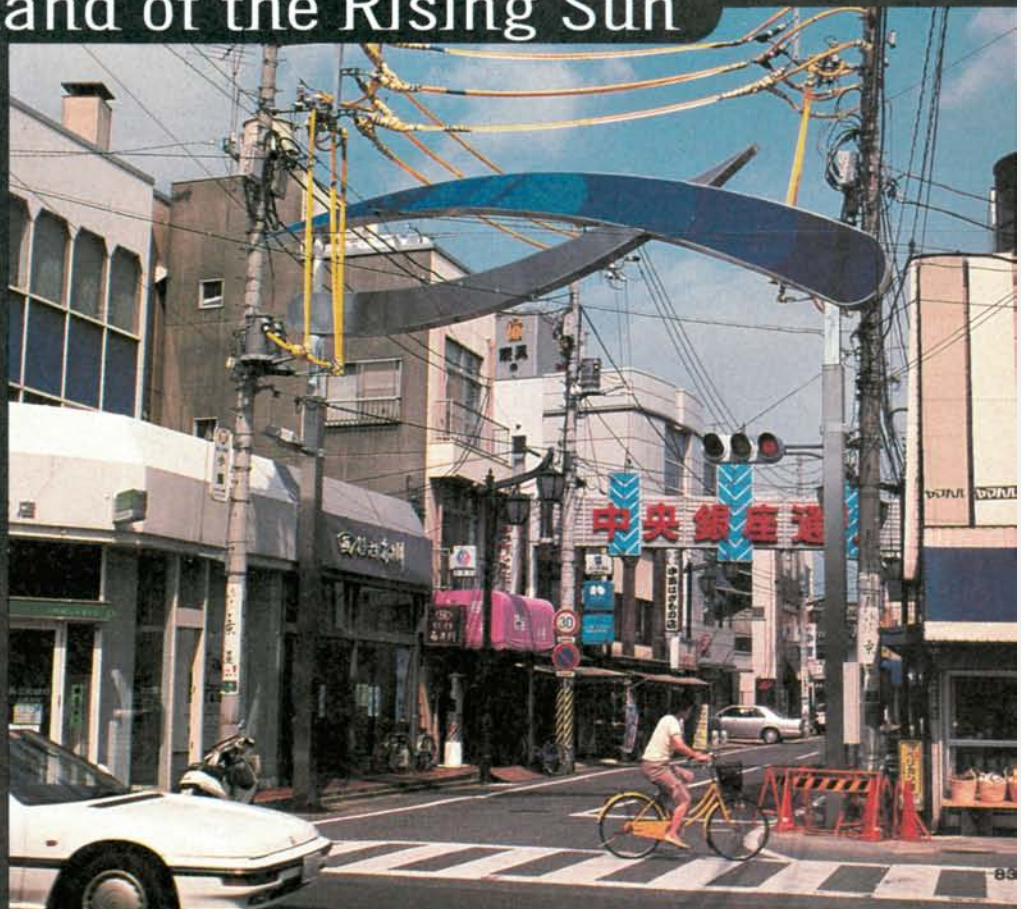


Mark Pavidis
and Matt
Francis capture
World
Championship
titles in beauti-
ful Tsukuba City,
Japan.

show in the Land of the Rising Sun



TIPS



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top racers. An additional 20 slots are allocated to the 2WD and 4WD A-Mains at the previous World Championships, and that brings the total to 150 racers. For one reason or another, some of the qualified drivers can't make the trip, and alternates fill the open slots. IFMAR receives resumes from drivers who would like

to be alternates, and the board members vote on who should advance to the Worlds.

This year, the event was held from August 10 through 20, and was hosted by the Yatabe Arena International R/C Raceway in Tsukuba City. Owned and operated by Yokomo, the arena was completely remodeled for the World Championships. Time constraints and the high cost of traveling to Japan took their toll; only 93 drivers made the trek to the Land of the Rising Sun, but the action was hotter than ever, and contestants had even better odds of making the A-Main.

HOW IT'S ORGANIZED

• **Practice.** The 2WD drivers are allowed three days of open practice and two 5-minute controlled practice heats (one before the Qualifiers and one before the Mains). The controlled prac-



A racer checks the schedule for his practice times.

tice heats allow drivers to practice under real racing conditions and to gather racing data from the track's AMB computerized lap-counting system. The 4WD drivers have a similar schedule, but have only two days of open practice.

Six qualifying heats determine the drivers' positions on the final qualifying list. The top 10 in both classes advance to the A-Main and compete for the title. The top 10 finalists then face triple A-Mains in which points are accu-



Yokomo's Yatabe Arena was the perfect facility for the Worlds. Yokomo spent millions of yen on perfecting the track for this event, and an all-new, covered pit area was built to accommodate the drivers and mechanics. For the drivers, there were plenty of pit tables, electrical outlets and fans. Computer monitors were strategically placed so that racers could see up-to-the-minute race results and information on upcoming events. A fully stocked pro shop and a large snack bar with resting area and vending machines were also among the many services available.

In a word, the track is "awesome."

The Track



sweeper. The sweeper fed into the narrow back straightaway that allowed some serious speeds (the fastest cars were clocked at 27mph going down this section of the track). A series of sharp right turns led the cars through the washboard section,

which was filled with moguls, small jumps and elevation changes. A hairpin left led the cars through the jump section, which consisted of a series of double and triple jumps (a lot of air time was seen in this section!). Next came a 180-degree right turn that crossed the goal line, and then the cars went through the control line, which I called



1/10オフロードカー



世界選手権

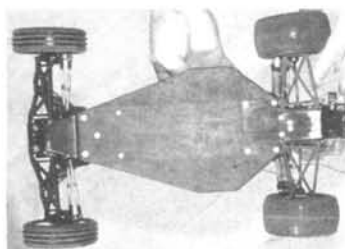
The infield was dressed up with AstroTurf™ green belts, and all the corners featured red-and-white-striped, cement corner markers that were extremely forgiving. The track's hard-packed surface held up to the 10 days of rigorous racing and required very little maintenance. The track was watered down at night and swept periodically between racing heats, but that's it.

The starting grid was directly in front of the drivers' stand and immediately went into a right-hand, high-speed

the "S"-turn section.

At the beginning of the event, many of the teams complained that the track's design didn't meet IFMAR rules. According to IFMAR, the lanes should be 3 meters wide, and I don't think this track had a single lane that was more than 2 meters wide. Even though the track was a little on the narrow side, the drivers didn't have any problems piloting their cars, and there were very few wipeouts (but these were the world's best drivers).

New Associated RC10B2



The long-awaited replacement for Associated's historical RC10 Team/Worlds car made its debut at the '95/'96 Worlds. Officially called the RC10B2, the 26 prototypes that made it to Japan met with great success. Five B2s made it in the A-Main, and Matt Francis literally ran away with the 2WD World Championship with his basically box-stock B2.

The B2 is a new design from the ground up and shares very few parts with its predecessor, the RC10—only the hard-anodized shocks and some of the transmission components, in fact. The B2 was designed with the help of the latest in computer-assisted design software (CAD), and much of the actual testing was done by a special program that actually simulates the way the car would react when it's raced on the track.

The car's new, molded chassis is by far its most distinguishing feature, but it's only the tip of the iceberg. The car also features a completely redesigned bellcrank system with built-in servo saver, extra-rigid suspension components, extra-long suspension arms, an adjustable battery compartment and a laydown shock design, which keeps the shocks as close to the center line as possible. The car's tranny has been noticeably beefed up to handle today's higher torque requirements, and the redesigned diff needs less maintenance than the previous unit. The car's tuning adjustments have also been considerably narrowed down to make the car easier to set up. According to Cliff Lett, the car steers better, jumps better, accelerates faster and is easier to dial in.



George Gonzalez— PHOTOJOURNALIST EXTRAORDINAIRE!

We gave George a mission: come back with killer action/scenery shots, interesting pit photos and, of course, a Pulitzer Prize-winning story. George left the U.S. in search of adventure, fun and winners. He ended up searching for the right bus to his hotel, places that would take American Express, a decent cup of coffee and people who could speak English. Maybe we weren't too clear with our instructions; he lost most of his money gambling and all he came back with was a wide variety of trophy-girl shots and pics of people eating bugs!



A Meeting with Matt— a World Champion

Immediately after he won the second A-Main and secured the 2WD World Championship, I pulled Matt Francis aside. Here's what he had to say.

GG: What's going through your mind right now?

MF: I don't know; I can't explain it; I did it! Whooh!

GG: So, how does it feel to be the World Champion?

MF: It's a

dream come true—definitely. It's been brewing for a long time. This is my first big win; in fact, my only win ever. I've gotten a lot of seconds and thirds, but never a win. I guess that's the way to do it—start off big.

GG: How do you like the new Associated B2?

MF: I got the car a few weeks ago, and it's just extremely easy to drive. Compared to my Team Car, the new car has more stability, more traction, more steering—just an all-around better car. I'm much more excited to drive than I was before, because I've been driving my Team Car for

over seven years. To get this car is just amazing, and to win the World Championship the first time I've raced it is unbelievable.

GG: Did you use any particular strategy?

MF: I came to the race knowing that I could do well, because I did pretty well at the Worlds warm-up race. Every time I did poorly, I just kept repeating to myself, "It's only R/C cars. It's only a hobby," and I tried to relax as much as I could. I also took deep breaths every now and then, which also helped to relax me. Whenever I messed up during practice, I reminded myself that it's only practice, and this helped me a lot.

GG: Any words of wisdom to pass on to our readers?

MF: Don't take R/C racing so seriously, and more important, don't burn yourself out by practicing too much. I generally practice around twice a week, which I feel is more than enough. Most important, though: just go out and have fun.



GG: In the second leg of the A-Mains, you made a pretty aggressive pass, for which you were cautioned by the race ref. It looked as if you ran over Masami's car to take back the lead. Can you explain what exactly happened?

MF: Well, Masami got around me in the first sweeper, and I knew I could pull away from him if I got close enough. I went for an aggressive pass. I know I probably shouldn't have done it, but you can't be a nice guy all the time. I guess I should have waited a little, but the more time that passed by, the harder it would have been to make a move. I didn't want to give him any more chances, so I went for the aggressive pass. Unfortunately, his car went out of control a little bit more than I wanted, but that's racing, and this has happened to me many times.





Left: no, this is not a cable TV antenna! This antenna picked up the racers' transmitter signals. Top: The signals were then sent through spectrum analyzers to ensure they were clean and glitch-free. Above: Brian Kinwald, who was plagued by radio problems, has his equipment checked out.

mulated according to finishing position (10 points for first place, 9 points for second, and so on). The drivers with the highest scores in their classes are crowned as world champs.

2WD CLASS

• **Qualifying.** During the six rounds of nerve-wracking Qualifiers, drivers never knew whether their best time would hold up after the next round. The top 10 were different after every heat, and drivers were bumped in and out like tennis balls. Consistency was the name of the game, and Team Associated factory driver Matt Francis was the most dialed. He was the only one to run a perfect 14 laps in all six Qualifiers, and in the last one, he posted an amazing 14/5:15.94 to take the TQ honors.

Masami Hirosaka was probably this class's most aggressive driver, and his 14/5:16.29 best time set the pace all the way up until Matt Francis swiped the TQ away from him in the last round. Greg Hodapp, Mark Pavidis, Mark Francis, Cliff Lett, Jack Johnson, Sohrab Tavakoli, Derek Furutani and Barry Baker were among the lucky drivers who made it to the A-Main. Constantly plagued by radio problems, the reigning 2WD World Champion, Trinity/Team Losi driver Brian Kinwald, was bumped out of the A-Main during the fifth round.

• **A-Mains.** First leg: using his prime position on the grid to his advantage, Matt

Traction Talk

The World Championships are usually the testing ground for many new tire treads and tire compounds; Pro-Line*, Team Losi* and Yokomo* all tested new tires, some of which worked better than others.

• **Pro-Line Squared Fuzzies.** These seemed to be the hot ticket when the track was dry and slick. They feature Pro-Line's ultra-soft M2 compound and a low-profile flat carcass with a reinforced interior and sidewall. The all-new, ultra-fine, square mini-pin

design seemed to hook up nicely when the track conditions were at their worst. The Squared Fuzzies were extremely successful at the Worlds; in fact, all 10 of the drivers in the 4WD A-Main and more than half of the drivers in the 2WD A-Main had them on their cars.

• **Yokomo Hot Laps T-51s.** These feature a staggered dash-pin design, an ultra-soft compound and oversize foam inserts. They were extremely fast in the morning when the track was still fresh.

The new Pro-Line tires and the ones by Yokomo were available only in limited numbers, so there weren't enough to go around. Naturally, the Pro-Line and Yokomo drivers had them

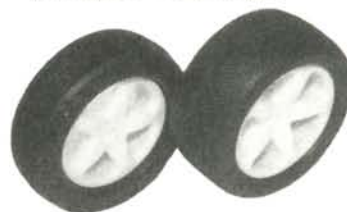


Masami rubs his tires on the ground for good luck.

(limited to 2½ pairs per driver), and that left a few drivers scrambling for traction,

but they'll be available by the time you read this article.

• **Team Losi.** The new Losi tires didn't hook up as well as the Pro-Line and Yokomo prototypes. The prototype



rears featured a mini-stub-nub tread pattern and were molded out of Losi's super-soft Silver compound. Losi also tested a new Silver-compound front tire that used a multi-rib design.

It's very unlikely that you'll ever find the Losi tires at your hobby dealer.



Francis shot out into the lead and never looked back. For the first minute, Masami Hirosaka and Mark Pavidis challenged him, but a giant pileup in the washboard section gave Matt a lead of nearly half a track. Masami dropped back to seventh, while Pavidis secured the second slot.

From this point on, the first and second

Masami started to work his way up from fifth, and when the end-of-race buzzer sounded, he was back on Matt's tail. Not a moment too soon, Matt crossed the line to take the win and secure the 2WD World Championship. Masami rolled in second; and Pavidis managed to get past Hodapp to secure third. The track-



Left: Team Associated's 2WD A-Main finalists. Right: Team Losi's 2WD A-Main finalists.



places were securely held by Matt and Mark, while Derek Furutani and Barry Baker battled for third. At the buzzer, Matt Francis crossed the line first and chalked up 10 points for his efforts; Mark Pavidis crossed second (9 points); and Derek Furutani picked up 8 points for third. Trackside referees cautioned Mark Pavidis, Jack Johnson and Derek Furutani about their overly aggressive driving.

Second leg: at the buzzer, Masami Hirosaka took off like a bat out of hell and somehow managed to get around turn one before Matt Francis, who had the prime spot on the grid. Masami held the lead for less than 30 seconds though, because on one of the turns, Matt ran over his car to regain the lead. Masami fell back to fifth; Greg Hodapp advanced to second; Mark Pavidis secured third; and Matt was way out in front.



Talk about close racing! You wouldn't want someone like Masami on your tail!

side referee warned Matt, and he was extremely lucky to be let off with just a warning (see "A Meeting with Matt" sidebar for more details).

Third leg: Matt Francis had already secured the World Championship, so he decided to take a "DNS" on the third leg

and allow the others to compete for second and third without interference. Once again, Masami stormed out in front, while Derek Furutani and Mark Francis battled it out for second. Masami was the only driver who went on to the 14th lap, and he took the win with ease; Derek Furutani took second; Mark Francis rounded up third.

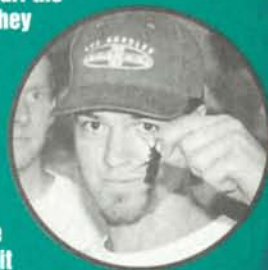
For his two A-Main finishes, Matt Francis earned 20 points and became the World Champion. Second place in the first leg combined with first place in the third leg earned Masami Hirosaka 19 points and the

Big Bucks for Bug-Eating!

Just as I was boarding the shuttle bus to head back to my hotel, I heard a lot of chanting and yelling from the pit tables. To my surprise, J.D. "the Duke" Beckwith was standing in front of a table with a live, giant bug in one hand and a wad of bucks (turned out to be nearly \$1,000) in the other. The bug was a 3-inch-long, 1-inch-thick Japanese beetle that had spines on all eight legs and, on its rear, a giant hook that looked as if it could cut through a small twig without effort. Some of the racers had pooled their money and bet J.D. that he wouldn't have the guts to scarf the insect. Boy, were they wrong!

It took J.D. a few attempts to wolf down the bug because it kept latching onto the inside of his cheek, but once he started to chew it, it went down like a piece of sushi. The racers who put up the money looked into his mouth to confirm that he had, indeed, munched the bug, and they found only assorted remains of the poor beetle.

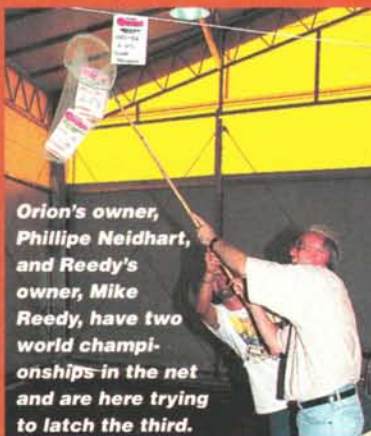
I won't go into detail about what he did shortly afterward; let's just say we'll have to change his name to J.D. "the Puke" Beckwith.



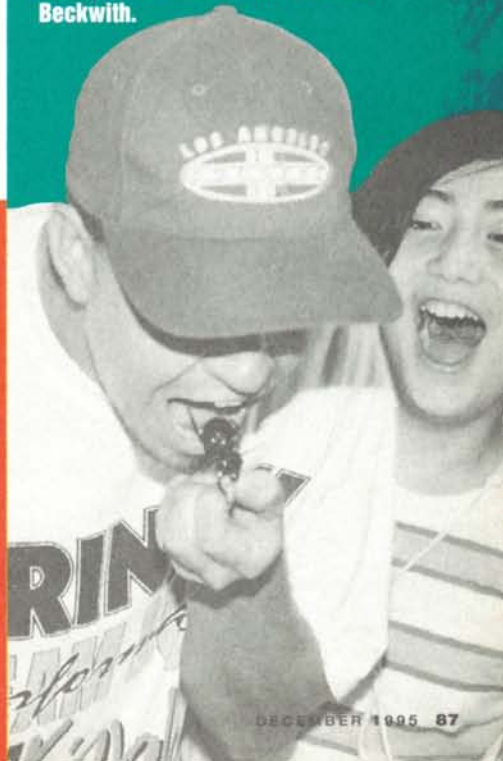
Team Orion and Reedy Modifieds Join Forces

To provide the best available cells, Team Orion and Reedy Modifieds have combined their efforts. Don't break out your credit cards just yet, because the cells won't be commercially available. The cells will be available to Orion/Reedy team drivers only, and they'll be used for the larger, world-class events, such as the European and IFMAR World Championships.

The cells undergo Orion's patented activation process and are custom-matched to fit any racing application (high voltage, or high capacity). Over 43 percent of the drivers at the Worlds used these cells, and both Matt Francis and Mark Pavidis captured the titles with these batteries installed in their rides.



Orion's owner, Phillippe Neidhart, and Reedy's owner, Mike Reedy, have two world championships in the net and are here trying to latch the third.



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second-place trophy. Derek Furutani's third in the first leg combined with his second in the third leg earned him 17 points and the third-place trophy.

4WD CLASS

• **Qualifying.** Mark Pavidis set the pace

early on when he posted a 14/5:0.50 in the first heat. His best time held until the fifth Qualifier, in which Brian Kinwald shocked the world by posting an amazing 15/5:21.34 to take the TQ honors and secure a prime piece of real estate on the starting grid. Mark's best time was good enough for second, though; and Barry Baker's 14/5:05.59 secured the show position. Other drivers who made the A-Main were Scott Brown, Masami Hirotsaka, Greg Hodapp, Patrick Feschtschenko, Mark Francis, Jack Johnson and Derek Furutani.



Above: Matt Francis—a happy 2WD World Champ. Below: 4WD World Champ Mark Pavidis says, "In your face, Masami!"



What's new in the PITS



KYOSHO LAZER PROTOTYPE

Here's a spy shot of Derek Furutani's prototype Kyosho Lazer. I can't tell you too much about the car because the folks at Kyosho were extremely hush-hush about it. I can tell you that the car ended up being both Derek Furutani and Greg Hodapp's ticket to the 4WD A-Main, and it seemed to handle the rough stuff better than any other 4WD car at the event. Unfortunately, it's very unlikely that this car will ever be available in the U.S., and if it is, it will probably have to be special ordered.

YOKOMO PROTOTYPE CHASSIS

Most of the Team Yokomo drivers used new, extremely trick graphite chassis and suspension pieces that were designed for the venerable YZ-10 4WD buggy. The chassis features improved battery positioning that places the cells more toward the front for improved steering, and it has more front kick for improved handling on bumpy tracks. The chassis met with great success at the Worlds: Brian Kinwald took the TQ honors, and Mark Pavidis secured the overall 4WD win with this equipment.



NEW NOVAK TEMPEST ELECTRONIC SPEED CONTROL

Novak Electronics* took the Worlds by storm with the introduction of their new Tempest ESC. It's packed with new features, including: six Hyperfet 2 drive transistors; an all-new, innovative circuit-board layout; an all-new narrow-case design with central wire exits; new extra-flexible 12-gauge wire; a whopping 420A current rate; and 210 amps of braking power. According to some of the team drivers, this unit provides smoother throttle response, quicker acceleration, increased braking power, longer run times and cooler operation. With all these awesome features combined with Novak's simple One-Touch Set-Up™, CLC 2 current limiter, and heavy-duty BEC circuit, the Tempest is sure to be a winner; in fact, six of the cars in both the 2WD and 4WD A-Mains were equipped with Novak Tempest ESCs.



SCHUMACHER'S NEW VISCOUS DRIVE UNIT

Several of the Schumacher* team drivers used the company's new Viscous Drive Unit in their 2WD buggies. It's

similar to the Team Losi Hydra Drive traction-control system that's included in all of Losi's top-of-the-line kits, but the Schumacher unit has some unique features that make it easier to install and dial in.

The Viscous Drive Unit uses ordinary shock fluid, so there's nothing special to buy or lug around in your pit box. The unit can be adjusted without being removed from the car and without changing the fluid (if you've ever rebuilt a Hydra Drive, you'll agree that this is a major benefit). It's made of hard-anodized aluminum, so it's light and durable and is sold as a universal kit (part no. U1767P), but the top shaft must be purchased separately (Losi no. U1789R and Associated no. U1790S).

2WD FIRST LEG

Fin.	Qual.	Name
1	1	Matt Francis
2	4	Mark Pavidis
3	9	Derek Furutani
4	10	Barry Baker
5	5	Mark Francis
6	2	Masami Hirotsaka
7	6	Cliff Lett
8	7	Jack Johnson
9	3	Greg Hodapp
10	8	Sohrab Tavakoli

4WD FIRST LEG

Fin.	Qual.	Name
1	5	Masami Hirotsaka
2	8	Mark Francis
3	2	Mark Pavidis
4	1	Brian Kinwald
5	10	Derek Furutani
6	3	Barry Baker
7	9	Jack Johnson
8	6	Greg Hodapp
9	4	Scott Brown
10	7	Patrick Feschtschenko

2WD SECOND LEG

Fin.	Qual.	Name
1	1	Matt Francis
2	2	Masami Hirotsaka
3	5	Mark Francis
4	9	Derek Furutani
5	8	Sohrab Tavakoli
6	6	Cliff Lett
7	10	Barry Baker
8	4	Mark Pavidis
9	7	Jack Johnson
10	3	Greg Hodapp

4WD SECOND LEG

Fin.	Qual.	Name
1	2	Mark Pavidis
2	4	Scott Brown
3	9	Jack Johnson
4	1	Brian Kinwald
5	8	Mark Francis
6	7	Patrick Feschtschenko
7	10	Derek Furutani
8	6	Greg Hodapp
9	5	Masami Hirotsaka
10	3	Barry Baker

2WD THIRD LEG

Fin.	Qual.	Name
2	9	Derek Furutani
3	5	Mark Francis
4	3	Greg Hodapp
5	7	Jack Johnson
6	6	Cliff Lett
7	4	Mark Pavidis
8	10	Barry Baker
9	8	Sohrab Tavakoli
DNS	1	Matt Francis

4WD THIRD LEG

Fin.	Qual.	Name
1	1	Brian Kinwald
2	2	Mark Pavidis
3	6	Greg Hodapp
4	5	Masami Hirotsaka
5	3	Barry Baker
6	2	Mark Francis
7	9	Jack Johnson
8	7	Patrick Feschtschenko
9	10	Derek Furutani
10	4	Scott Brown

1995
IFMAR
off-road
日本
WORLD
CHAMPS

• A-Mains.

First leg: Brian Kinwald and Masami Hirosaka got off to a clean start and managed to avoid a giant pileup going through the first sweeper. Brian's car seemed to have the edge in horsepower, but at around the 2-minute mark, Masami's car was

practically pushing his car out of the way in the corners. Going through the washboard section, Brian got a little wild and Masami took the lead. This only lasted for around 20 seconds, though; going through the triple jumps, Brian took back the lead.

The battle continued until disaster struck: going around the tight washboard section, Masami decided to pass Brian and ended up punting his car out of the way. (After viewing the videotapes of this race, I think Masami made a clean pass and that the contact between the cars was minimal and purely accidental.) Brian ended up at the back of the pack and Masami inherited a commanding lead.

Mark Francis secured second place and stayed there, despite being challenged by Pavidis; Masami took the controversial win and rounded up 10 points. Francis' car crossed second to collect 9 points, and Pavidis earned 8 points and third place.

Second leg: Brian Kinwald once again



charged out in front, but his lead didn't even last one lap. Entering the jump section, Mark Pavidis got around Brian and took the lead. Brian stayed within striking

distance of the lead, but Scott Brown and Jack Johnson was there, too. At around the 2-minute mark, Brian took another spill and let Brown and Johnson pass him by.

2WD A-MAIN FINAL POINT STANDINGS



Fin	Qual	Points	Name	Chassis	Motor
1	1	20	Matt Francis	Assoc. RC10B2	Reedy Sonic 10-turn double
2	2	19	Masami Hirosaka	Assoc. RC10B2	Reedy 11-turn quint
3	9	17	Derek Furutani	Losi Double-X	Maxtec 13 double
4	5	16	Mark Francis	Assoc. RC10B2	Reedy 10-turn double
5	4	13	Mark Pavidis	Assoc. RC10B2	Reedy 11-turn quint
6	10	11	Barry Baker	Losi Double-X	Maxtec 12-turn
7	6	10	Cliff Lett	Assoc. RC10B2	Reedy 11-turn quint
8	7	9	Jack Johnson	Losi Double-X	Trinity 12-turn double
9	3	9	Greg Hodapp	Losi Double-X	Maxtec 12-turn
10	8	8	Sohrab Tavakoli	Losi Double-X	Peak Performance 12-turn

4WD A-MAIN FINAL POINT STANDINGS



Fin	Qual	Points	Name	Chassis	Motor
1	2	19	Mark Pavidis	Yokomo YZ-10	Reedy 10-turn double
2	1	17	Brian Kinwald	Yokomo YZ-10	Trinity 11-turn quad
3	5	17	Masami Hirosaka	Yokomo YZ-10	Reedy 10-turn double
4	8	15	Mark Francis	Yokomo YZ-10	Reedy 10-turn double
5	9	12	Jack Johnson	Yokomo YZ-10	Trinity 10-turn triple
6	6	11	Greg Hodapp	Kyosho Lazer ZX-R	Maxtec 12-turn double
7	3	11	Barry Baker	Yokomo YZ-10	Maxtec 12-turn double
8	4	11	Scott Brown	Yokomo YZ-10	Trinity 11-turn quint
9	10	10	Derek Furutani	Kyosho Lazer ZX-R	Maxtec 12-turn double
10	7	8	Patrick Feschtschenko	Yokomo YZ-10	Evolution 11-turn triple



1. Pro-Line's Tim Clark (left) and Todd Mattson (right) with 2WD World Champ, Matt Francis (center). Matt points at the Pro-Line Squared Fuzzies that helped him capture the title. 2. Trinity's motor man Neal McCurdy works diligently—10 days inspecting motors! 3. Matt's winning car enters the control section. 4. Yokomo's Tom Yokobori (right) hands Brian Kinwald (left) a trophy for his amazing TQ run in 4WD. 5. Team Maxtec made a strong showing; all their drivers qualified for the 2WD and 4WD A-Mains. Front row: Suparat Uahwatanasakul (left); Pete Deesarapad (right). Back row (left to right): Barry Baker, Greg Hodapp, Derek Furutani. 6. Miguel Koide was the only driver from Madrid, Spain. 7. Maxtec/Extreme Motor Sport's Erik Soderquist plays Hackey-sack with a couple of Losi Double-X buggies. 8. South Africa's R/C racing team. 9. Great Britain's Craig Drescher (right) and Alan Harman. 10. Jack Johnson being fanned by one of his loyal servants. 11. Mr. and Mrs. Hirotsuka relax after a long day of Qualifying. Mrs. Hirotsuka prepared fruit slices for us; thank you! 12. Yokomo president Tom Yokobori and his son Koichiro with a baby Godzilla. 13. Rick Hohwart from Peak Performance prepares a battery pack. 14. The Francis brothers (Mark and Matt) with their new Associated RC10 B2s. 15. Reedy Modifieds' Darren Westman snoozes after the Qualifying. 16. Team Losi's Scott Brown wrenches away at his YZ-10. 17. Who says it's all work and no play? Gene, Midge and Curtis Hastings catch some sights. 18. My pals from New Zealand. Thanks for all your lunacy, guys!

Meanwhile, Pavidis's lead was getting larger, and Brown had gained a comfortable second-place position. After that, nothing changed, and Pavidis ended up taking the

win and 10 points for his troubles. Brown crossed the line second to earn 9 points, while Johnson settled for 8 points and the third-place finish.

Third leg: at this point, the 4WD World Championship title was still up for grabs. Brian Kinwald took the lead with a vengeance, and you could tell that nothing would stop him from winning. Meanwhile, Mark Pavidis, Masami Hirotsuka and Greg Hodapp all battled for second. Kinwald held on to the lead to the very end, but the ever-important second place wasn't decided until the last corner. The end-of-race buzzer sounded, and Kinwald crossed the line first. Hodapp came around the last corner fast and furious and side-swiped Masami into the boards. This gave Pavidis enough room to squeeze in for second place; Hodapp took third, and Masami's car waddled in to finish fourth.

The points were tallied; Mark Pavidis had 19 points and the 4WD World Championship. With 17 points, Brian Kinwald took second by a tie-breaker against Masami, who had the same number of points but had to be content with third.

R/C Car Action congratulates Matt Francis and Mark Pavidis for their accomplishments and thanks Yokomo for the awesome track. We also thank all the people who worked so hard to make this racing event a reality. I extend my personal thanks to translator Mr. Bunzo Iizuka, who put up with all my bellyaching. The next World Championships will be held in the U.S., and we're already getting geared up for the event. See you there next time!

*Addresses are listed alphabetically in the Index of Manufacturers on page 192.

Battery	ESC	Radio	Servo	Gearing	Body	Tires (F/R)
Reedy/Orion Sanyo 1700 SCRC	LRP ICS Digital	Airtronics Caliber 3Ps	Airtronics 94155	17/84	Associated	Losi Full Radius Silver/ Pro-Line Squared Fuzzies
Yokomo Sanyo 1700 SCRC	Tekin G-12	KO 2-stick	KO PS-1012	18/81	Associated	Yokomo T-51/ Yokomo T-51
World Class Sanyo 1700 SCRC	Tekin G-12	Sanwa 3PS w/KO Receiver	KO Propo 1002	21/84	Jammin	Yokomo T-51/ Yokomo T-51
Orion Sanyo 1700 SCRC	LRP ICS Digital	Airtronics Caliber 3Ps	Airtronics 151	18/81	Associated	Losi Full Radius Silver/ Pro-Line Squared Fuzzies
Orion Sanyo 1700 SCRC	LRP ICS Digital	Airtronics CS2P	Airtronics 94155	18/81	Associated	Yokomo T-51/ Yokomo T-51
Keil Pushed Sanyo 1700 SCRC	Novak Tempest	Airtronics Caliber3Ps	Airtronics 94155	22/84	Jammin	Yokomo T-51/ Yokomo T-51
Reedy/Orion Sanyo 1700 SCRC	LRP ICS Digital	Sanwa Caliber	Sanwa 151	18/84	Associated	Losi Full Radius Silver/ Pro-Line Squared Fuzzies
Trinity Sanyo 1700 SCRC	Novak Tempest	JR R-756	JR NES 4735	19/84	Jammin	Yokomo T-51/ Yokomo T-51
World Class Sanyo 1700 SCRC	Tekin G-12	Airtronics Caliber 3Ps	Airtronics 94155	19/84	Jammin	Yokomo T-51/ Yokomo T-51
Orion Sanyo 1700 SCRC	Novak Tempest	Airtronics Caliber 3Ps	Airtronics 94155	19/84	Jammin	Yokomo T-51/ Yokomo T-51

Battery	ESC	Radio	Servo	Gearing	Body	Tires (F/R)
Reedy/Orion Sanyo 1700 SCRC	LRP ICS Digital	Airtronics CS2P	Airtronics 94151	17/87	Yokomo	Pro-Line Squared Fuzzies
Trinity Sanyo 1700 SCRC	LRP ICS Digital	Airtronics Caliber 3Ps	Airtronics 94151	19/87	Yokomo	Pro-Line Squared Fuzzies
Yokomo Sanyo 1700 SCRC	Tekin G-12	KO 2-stick	KO PS-1012	17/87	Yokomo	Pro-Line Squared Fuzzies
Reedy/Orion Sanyo 1700 SCRC	LRP ICS Digital	Airtronics Caliber 3Ps	Airtronics 94155	17/87	Yokomo	Pro-Line Squared Fuzzies
Trinity Sanyo 1700 SCRC	Novak Tempest	JR R-756	JR NES 4735	17/87	Yokomo	Pro-Line Squared Fuzzies
World Class Sanyo 1700 SCRC	Tekin G-12	Airtronics Caliber 3Ps	Airtronics 94151	20/87	Kyosho	Pro-Line Squared Fuzzies
Keil Sanyo 1700 SCRC	Novak Tempest	Airtronics Caliber 3Ps	Airtronics 94151	17/87	Yokomo	Pro-Line Squared Fuzzies
Trinity Sanyo 1700 SCRC	Novak Tempest	JR Z-756	JR NES 4735	17/87	Yokomo	Pro-Line Squared Fuzzies
World Class Sanyo 1700 SCRC	Tekin G-12	Airtronics Caliber 3Ps	KO PS-1012	20/87	Kyosho	Pro-Line Squared Fuzzies
Mega Sanyo 1700 SCRC	Helbing	KO EX-1	KO PS-1002	17/87	Yokomo	Pro-Line Squared Fuzzies

Full-size technology in a pint-sized package

RPM 2-Stage Shock Pistons

by FRANK MASI

A shock absorber works in two directions: compression (in) and rebound (out). Often, to achieve the smoothest ride or the best handling, the shocks used on full-size vehicles are designed to be stiffer during rebound than during compression, or vice versa. The action of the shocks in R/C model cars is equally stiff during compression and rebound. Here are some reasons for this:

- It's thought that R/C model shocks are too small to make use of the complicated valving found in full-size shocks.
- Shock designs are kept simple so that the average modeler can build them.
- No one has been able to prove that performance would really improve if R/C vehicles used the type of sophisticated damping that's used on full-size vehicles.

Richard Royall of RPM* thinks that R/C vehicles could benefit from some "trickle-down" technology from the full-size arena. His company has recently released 2-stage pistons to fit Team Losi* and Associated* shocks. Royall claims that these new pistons will provide true, two-stage damping just like the shocks on full-size vehicles.

2-STAGE: HOW THEY WORK

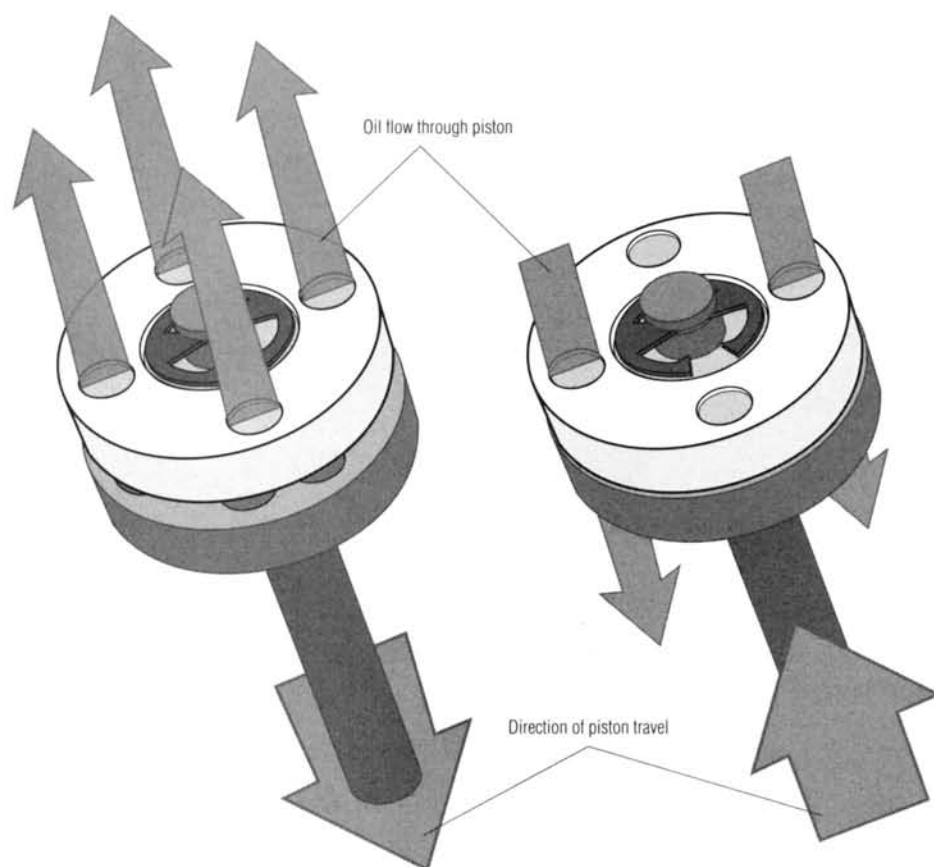
RPM's 2-stage pistons are designed to provide variable damping, i.e., stiffer shock action in one direction and lighter action in the other. This is achieved with a clever, two-piece shock piston that has a stationary half and a "floating" half.

During shock compression, the RPM piston acts like a standard, two-hole piston, like those from Associated. During rebound, however, the floating piston half is pulled away from the stationary half, which opens up two additional holes through which the shock oil can pass. When this happens, the shock's damping action becomes much less stiff—as if the shock were filled with lighter oil.

By installing the RPM piston upside-down, you can reverse the above conditions so that shock action is lighter during compression and stiffer during rebound.

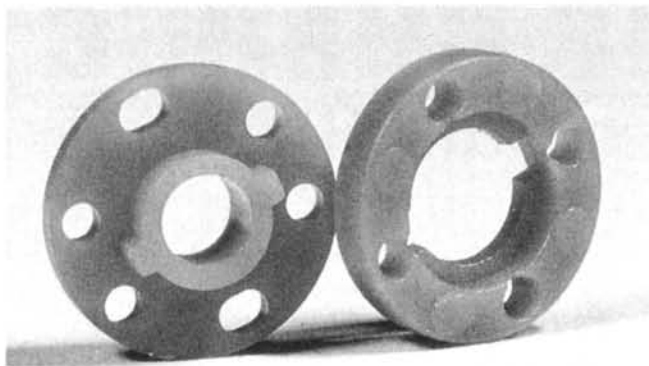
PICKIN' PISTONS

RPM's pistons come in six sizes. In the light/medium kit (part no. 8042), you get three sets of pistons with damping that's between that of Associated's no. 1 and 2 pistons and between Losi's no. 54 and 55 pistons.



During rebound, the floating piston moves away from the stationary piston to allow more oil to flow through the piston. This results in lighter damping.

During shock compression, the piston is forced into a closed position. Damping is much stiffer.



RPM's 2-stage pistons provide variable damping, i.e., stiff shock action in one direction and lighter action in the other direction.

The medium/heavy kit (part no. 8043) contains three sets of pistons with damping that falls between Associated's no. 2 and 3 pistons and between Losi's no. 56 and 57 pistons. Each piston set is color-coded according to the size of the holes in the floating piston (all of the stationary pistons have holes of equal size, except the purple stationary piston, which has smaller holes).

THE ACID TEST

To test the new pistons, I built two sets of rear shocks for an RC10 buggy. The first set consisted of Associated's no. 1 pistons and 30WT silicone shock oil. I installed RPM's blue, 2-stage pistons in the other set, filled them with 30WT oil and adjusted the shocks so that they would be stiffer during compression than during rebound. According to RPM, the damping of its blue, 2-stage pistons (in a "closed" state) is equal to that of Associated's no. 1 pistons.

I tested the buggy on a very bumpy, off-road track that had many small, sharp holes in its surface. After running the car with the stock pistons, I switched to the RPM pistons.

Compared with the stock pistons, the

2-stage pistons allowed the car's rear suspension to conform better to the track's surface. I also noted that with the 2-stage pistons, the car's rear end tended to rise past the proper ride height after the car went over a bump. Hmm. My first thought was that although the green Associated springs

had worked well with the compression damping of the 2-stage pistons, they were a bit too stiff for the lesser rebound damping.

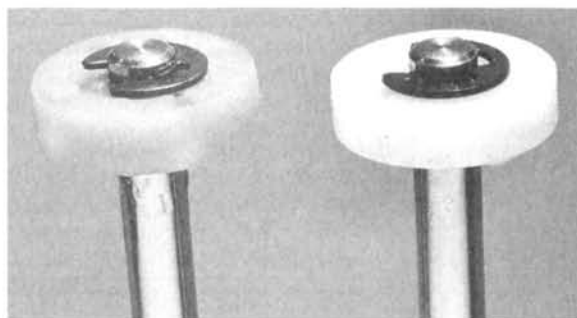
Switching to slightly softer rear springs (Associated's black springs) solved this problem. I worried that softer rear springs would cause the car to bottom out excessively over jumps, but I was proven wrong; the damping of the 2-stage pistons during compression was more than adequate.

As a final test, I flipped the 2-stage pistons over so that they would provide less damping during compression and more damping during rebound. To keep the rear suspension from bottoming, I reinstalled the stiffer, green springs. On a track that had small, sharp bumps, this setup actually proved to work the best for me. The light compression damping allowed the rear sus-

pension to work quickly over bumps without bouncing, and because the shock's damping was heavier during rebound, the stiffer springs no longer caused the rear suspension to rise too quickly and too far.

I later spoke to Richard, and he clued me in on setups that RPM's test drivers have found to work well:

- For most tracks, start off with red pistons and 25 to 30WT oil in the front shocks. Also, use red pistons in the rear with 30 to 35WT oil.
- On high-bite tracks, switch to the green pistons, and fill all of the shocks with 30 to 40WT oil. The green pistons provide "heavier" damping and tend to make the car more stable on smoother, faster tracks.

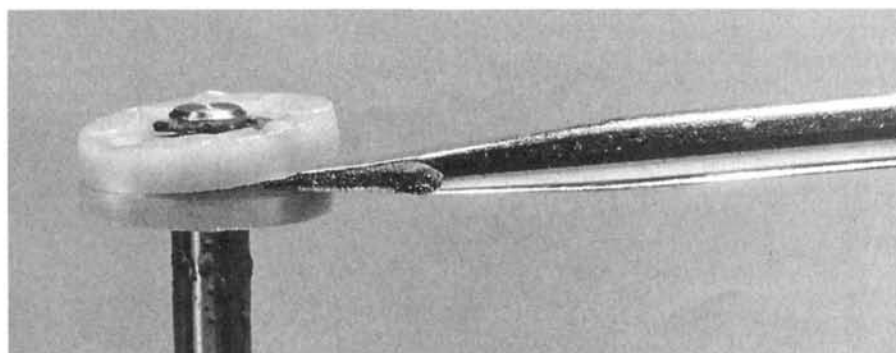


I tested RPM's blue 2-stage pistons (left) in my RC10 buggy and compared them head to head with Associated's no. 1 pistons while using 30WT oil. The 2-stage pistons were installed so I would have stiffer compression/lighter rebound. After much experimentation, I found that the 2-stage pistons improve handling on tracks that have many small, sharp bumps.

FINAL THOUGHTS

RPM's 2-stage pistons are an interesting product that merits more than just a curious glance. There's some neat technology here, but plan to spend some time at the track if you want to get the right combination of compression and rebound damping. If you're a novice driver, you may wish to stick with your kit's stock pistons until you gain enough experience to be able to use the 2-stage pistons correctly. But if you choose the right combination of 2-stage pistons and shock oil, you'll notice a distinct difference in damping on just about any track surface. I highly recommend these pistons to all racers who have at least moderate knowledge of shock damping principles.

*Addresses are listed alphabetically in the Index of Manufacturers on page 192.



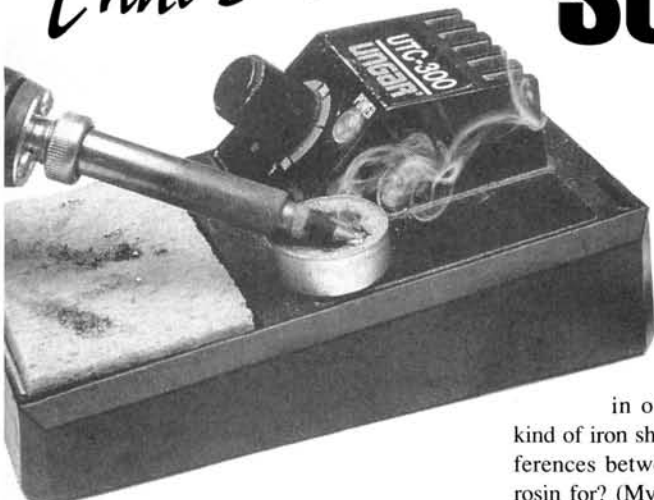
During compression, RPM's 2-stage piston acts like a standard piston. While the shock piston is rebounding, though, the two halves separate (as simulated in this photo with the help of a small screwdriver), and this opens up two more holes that lighten the damping effect. The piston can be reversed so the opposite will be true: lighter compression and stiffer damping.

IF YOU'RE involved with the R/C hobby, sooner or later, you'll have to do some soldering. It's a fact of life. Whether you want to install capacitors on a motor, plugs on a speed control, or battery bars on those new, high-voltage mega-zappo Ni-Cd cells, it really pays to know how to do the job right. The price you'll pay for doing the job incorrectly will be high: you'll have voltage loss, hot or inefficient connectors and the ever-popular jumping capacitors. (You know those, don't you? They're the ones that jump off the side of the motor can every time you go over a bump.)

*Yeow!
That's hot!*

Become a Soldering Expert

by Doug Mertes



What is soldering all about? What's the point of it? Why do some people give up on connectors altogether and "hard-wire" their high-voltage connections? Is it possible to solder some of the teeny wires we find

in our cars and trucks? Which kind of iron should I buy? What are the differences between types of solder? What's rosin for? (My, we're just full of questions, aren't we?)

Let's take on these issues one at a time, and see whether I can't make you a soldering expert—or, at least help you cure your case of jumping capacitors!

SOLDERING SMARTS

You don't have to solder every connection, but it's best if you do. Forget about soldering highly efficient battery plugs onto your packs and ESC, and just crimp on some Tamiya* connectors. They'll work, but you'll discover how much power you're losing when you grasp them firmly at the end of a battery dump. They can get really hot, and that heat is the result of resistance at the plug where they're connected. Wasted voltage! Instead of soldering power leads onto your stock or modified motors, you could use those push-on motor connectors. The fit between the plug and the motor lug will virtually ensure a major loss



Solder and rosin...rosin and solder; they just go together well. This is plain old Radio Shack 60/40 solder. Use either the paste or the liquid rosin flux to help you make beautiful solder joints.

You need to have the right tool for the job. The Ungar UTC-200 is a good all-around iron; the Weller soldering gun is a little heavy, but it gets the job done! You could also use a simple pencil-type iron as long as it's rated at a wattage that's high enough.

of voltage. Bye-bye, first place! Nope, I'm afraid that you'll just have to learn how to solder.

Our solder is made up of metal alloys, usually tin and lead in a 60/40 mix, with a little rosin flux embedded in the center. The tin imparts strength and conductivity, while the lead keeps the joint somewhat flexible and ensures that the solder flows evenly into all the little cracks and crevices between the parts being joined. Having the

solder flow well is critical to making a good solder joint; it ensures optimum voltage transfer between the wires and a minimal loss of amps. A high-quality solder joint will allow voltage to flow more efficiently than a connector or a pair of twisted wires will; and if properly made, it will also be more reliable than a plug.

HARD-WIRING

To go really fast, do you have to hard-wire (solder) every connection? Some people think so, but I'm not completely convinced. I hard-wire the connections in the cars I race, especially when I'm going to a track where there's AC power for my soldering iron. But when I'm at an outdoor track or a parking lot, I run a car and batteries that use highly efficient connectors. (For more information on plugs, see "Connector Inspector, Part 2" in the September '95 issue of *R/C Car Action*.) Hard-wiring ensures that the wire won't come off the battery or motor, even in a really brutal crash, but it takes time and dedication to hard-wire all the connections in all of your cars. Besides, I've won more than my share of A-Mains using plugs, and I've been beaten more than once by guys who have plugs on their batteries and motors!

Many drivers would like to shorten servo wires and ESC wires to make them fit a custom installation. This task is only for electronics and soldering experts, and it requires

can shorten servo wires pretty easily by just cutting and joining them with soldered joints and then using small-diameter shrink-wrap (such as blue Du-Bro* wrap) or rubber fuel line to protect the joint from shorting out.

Removing and re-soldering the wires inside a servo or an ESC case, however,



is not something to attempt on a whim. When you first try something like that, enlist an expert's help. Radio antennas—another likely replacement request—are best replaced by the manufacturer so that the receiver can be re-tuned at the same time. Does this sound like the voice of experience?

YOU'LL NEED

- **Soldering iron.** To start with, you'll need a good soldering iron. "Good" means one that's rated at 40 watts or more for general work. If you plan to solder battery packs, you'll need something with a higher wattage. Your iron should also have a well-insulated handle and a stand of some sort to prevent it from burning your work surface. A number of companies (Ungar*, Weller* and Radio Shack) make variable-temperature irons that you can set to the appropriate temperature for the job you want to do.

I've seen lots of people using soldering guns at the track; I have one as a back-up in case my iron needs repair. They work very well for what I call "grunt soldering"—

Put a little flux on the parts to be soldered, especially if this is the first time you've applied solder to them.



thin-wire solder, good eyesight, a steady hand, an iron with variable heat and an understanding of what you're doing. You

Six Soldering Steps

- 1 Just crank up the old iron, and give it enough time to get really hot (at least a minute).
- 2 Clean the tip on a damp sponge, or with some tip cleaner available from electronics stores, and then "tin" it with a little solder. Keep the tip wet; it will transfer the heat more rapidly from the iron to the parts being soldered.
- 3 Use a pair of needle-nose pliers to hold wires while you solder them onto such things as motors and batteries.
- 4 Begin by heating the two pieces of metal that are to be soldered. The pieces must be clean and free of grease; they should get hot enough to melt the solder when it's applied (to the joint, not to the iron), but they should obviously not reach their melting point. A little practice here goes a long way. If you have to hold the iron against the pieces for more than 10 or 15 seconds, the iron isn't hot enough, or it doesn't have the wattage to do the job. If it's just transferring heat to the parts, and not heating them enough, you'll never get things soldered properly. Get a hotter iron. (Trust me on this one.)
- 5 Introduce the solder, whose melting point is below that of the pieces that are to be joined. This solder melts and flows between the pieces to give a bond that's stronger and better looking than one obtained by simply twisting the ends of the pieces together; and it conducts electricity more effectively than plugs or connectors. Put just enough solder on the parts to produce a smooth joint. If you use too much, it will drip off, glob up, or run down the wire.
- 6 Protect the completed joint with some shrink-wrap of the proper diameter, or a short length of silicone fuel tubing. I like the tubing, because it's reusable. Tape is just ugly.

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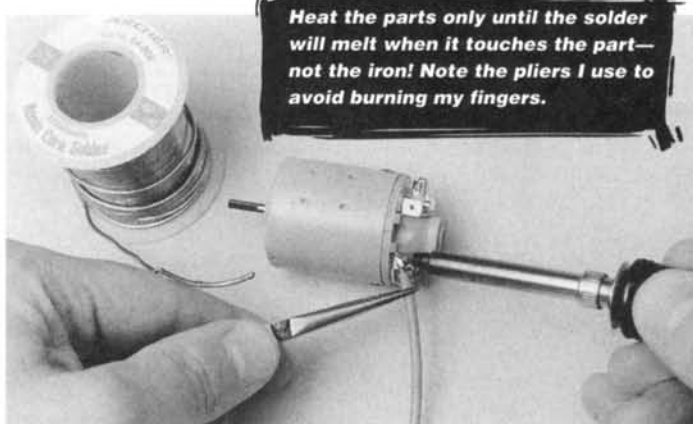
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BECOME A SOLDERING EXPERT

when installing battery packs and motor connections—but their tips are usually pretty small, and that makes them poor choices for assembling battery packs. Guns are also pretty porky, so they're hard to use in tight spaces.

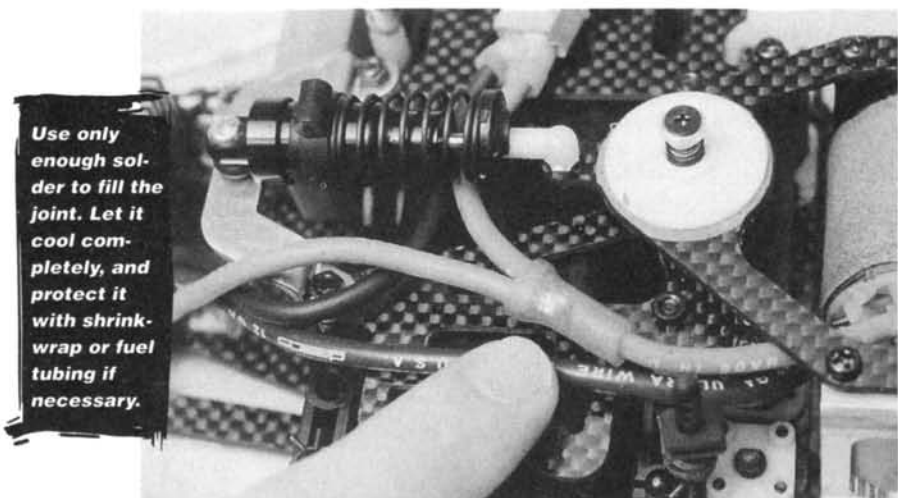
I prefer a pen-cil-type iron, because I can get it into tight chassis places without melting parts such as body posts and tires.

If you absolutely must take a soldering iron to a track at which there isn't any 120V AC power, take a butane-powered iron. Several companies, e.g. ButaSol, make



Heat the parts only until the solder will melt when it touches the part—not the iron! Note the pliers I use to avoid burning my fingers.

can (I use Kester SP-44). Used sparingly, rosin flux will clean and etch the surface being soldered, and it will make the joint smooth and strong. When you first solder new wires, motor cans and battery terminals, apply a drop or dab of rosin flux, and you'll avoid making the dreaded gloppy,



Use only enough solder to fill the joint. Let it cool completely, and protect it with shrink-wrap or fuel tubing if necessary.

them; they do a pretty good job and hold enough fuel to last for a day or two at the track. I've also seen people do a good job with 12V irons that run off a car battery.

Before buying an iron, try to find someone who has an iron that you can try before you buy; check the iron's capabilities so that you don't get stuck in the field with the wrong one.

• **Solder.** I use good old Radio Shack 60/40 alloy with rosin flux, in the 0.062-inch size. You can buy it thinner and thicker, but this works well for me. Some people swear by silver solder, but I find it too expensive for my pocket.

• **Rosin flux.** This is solder's best friend; it comes as a liquid (Trinity* and Competition Products* are just two of the companies that sell it) and as a paste in a

sloppy, lumpy solder joints that make other racers point and laugh.

• **Needle-nose pliers**—to hold the parts being soldered. This helps you to avoid burning your fingers, and it makes you a lot less nervous about doing the job.

PRACTICE MAKES PERFECT

Practice on some of those nasty old pieces of wire that ended up on the floor under your workbench. Then graduate to putting new caps on those old, worn-out motors that rattle around in the back of the lower drawer in your toolbox. By the time the next big regional event rolls around, your racing buds will be standing in line to ask you to solder up their handout motors. That's right—you! The soldering expert!

**Addresses are listed alphabetically in the Index of Manufacturers on page 192.*

Simply put, a Ni-Cd battery pack provides electricity through a chemical reaction. The battery contains a limited amount of chemicals (determined by battery-case size). So, when all the chemicals have reacted with one another, the battery dies (what we "R/C-brained" people refer to as "dumping"). Fortunately for us (and our wallets), this process is reversible. Just place the

dumped pack on a battery charger, and the battery will again be capable of delivering electricity.

But how do you know when the battery has been fully charged? If you don't charge the battery long or hard enough, it won't be fully charged and will dump prematurely. At best, this would mean an early end to having fun; at worst, it would mean the loss of a big race. So why not just charge the dickens out of the battery, making sure it is fully charged and then some?—because of battery heating.

As long as the current going into a battery is charging the battery, heating is minimal. But, when the battery has been fully charged, incoming current shows up as gas.

To prevent the battery from exploding from the pressure caused by the gas generated by overcharging, all cells have a venting system. When venting occurs, a battery loses liquid, which reduces the amount of chemical reaction that can occur and, in turn, the battery's capacity. So it's important to control the amount of charge

that goes into a battery pack. The two most common ways to do this are timed charging and peak-charging.

• **Timed charging.** This is the most common way to charge a battery because it is the least expensive. To use a timer charger, first make sure that the battery has been fully discharged. Do this by placing the battery pack in a car and running it until it just "won't go no more." Then place it on the charger, set the timer to 15 to 20 minutes, and let it charge until the time runs out. Most timer chargers come with a chart that indicates how long you should charge batteries; it depends on their rating: 1200mAh, 1500mAh, etc. This timed method is usually designed to place an 80- to 90-percent charge on the battery; this provides reasonably good run times and prevents damage caused by overcharging.

• **Peak-charging** can be accomplished in two ways. The first is to monitor the rapid temperature rise that occurs after a battery has reached full charge. This method

is seldom used because it requires that a temperature probe be attached to the battery. If the probe is not in good contact with the battery, it may miss the peak and allow severe overcharging.

The more common type of peak-charging is based on the fact that the voltage of a charging Ni-Cd battery rises steadily until it is fully charged; then the voltage peaks and starts to fall. The peak-charger detects this drop automatically and shuts off.

With a peak-charger, you can start with a partially discharged battery pack, because the voltage will automatically be cut off at full charge. But, to avoid "cell memory," it's best to discharge a battery completely (at least occasionally). I understand that advances in battery technology have virtually eliminated Ni-Cd memory. But I still feel it's best to fully discharge a battery pack before recharging. The peak-charger has two advantages over the timer charger: convenience and the capability to fully charge a partially charged pack.

Now that you have a basic idea of how they work and what kinds of chargers are out there, let's look at what's available.



CHARGING TERMS

• **AC, DC, or AC/DC.** When looking at a new charger, it will be specified as one of the above.

An AC charger operates on 115V AC house current only. If all your R/C activities are at home, or if your racing site provides 115V AC power, this is a good choice.

A DC charger runs on 12V DC only. The most common source of 12V DC is a car battery. This is the charger of choice for people who operate at an outdoor site that does not have 115V AC power available. This type of battery charger can be operated on 115V AC power with the use of a separate 12V power supply.

Of course, the best of both worlds is an AC/DC charger, which works on both.

• **Volt/amp meter.** Knowing the amount of current, or charge rate in amps, and the battery pack's charging voltage can be helpful for proper battery charging.

Chargers generally have two ways of providing this information to the user. Some chargers have a built-in amp meter that displays the charging current. Two types of meters are common—analogue and digital. Others have a set of jacks that permits the use of an external voltmeter. Some chargers do not have a current meter; rather, they're preset to an acceptable level, or they have a calibrated current set knob.

• **Flex charging.** As batteries get older, they develop two problems: lower capacity and higher internal resistance, which are caused by crystallization and accumulation of impurities on the plates of the cells. Flex charging breaks up these crystalline deposits. This is how most packs can be restored close to their original capacity.

Flex charging incorporates an occasional heavy discharge current. This discharge current is large enough to break up the crystals, removing them from the cell plates. The discharge pulse is short enough not to cause negative charge.

• **Discharging.** Some battery chargers have built-in discharge circuits. If a battery pack is only partially discharged and then recharged repeatedly, "cell memory" may occur. The cell tends to remember the limited use and soon will have only this capacity left. I am told that this problem is not as pronounced in today's modern cells, but it's still best to store Ni-Cds fully discharged. So, some chargers have a built-in discharge circuit. Some chargers have a display that tells how much total current (in mAh) was removed from the battery.

• **Trickle-charging.** Trickle-charging is a mode that permits very slow charging. The heat generated by fast overcharging can destroy a battery. But the trickle-charge current level is so low that the heat it generates can be safely dissipated without causing the cells to vent.

• **Cell memory.** Reduction of cell capacity due to repeated partial discharge or charge. With repeated cycles, the cell's total capacity will become equivalent to the partial discharge/charge.

TIMER CHARGERS

HOBBICO*



900-Series Chargers AC/DC

No. 900 • \$39.95
No. 905 • \$57.95
No. 910 • \$64.95
No. 920 • \$94.95

These chargers are easy to operate on AC and 12V DC power. Just connect the charger to a power source, connect a fully discharged battery, and set the timer. The charger will fast-charge until the preset time has elapsed, and then it will automatically switch over to a trickle-charge.

- The 900 is the budget-priced model. It has a preset fast-charge level but no meter.

- The 905 adds an amp meter and discharge capability. The meter allows you to monitor the charge rate in amps. A charge/discharge switch will place the 905 in the discharge mode. The meter will then read discharge amps. By monitoring the meter, it is possible to see how much charge was left over after a race.

- The 910 has all of the above features plus a charge-level control for both fast- and trickle-charging. This unit also has voltage-output jacks that allow

you to monitor voltage during charging with an external voltmeter.

- The 920 is the Cadillac of timer chargers. It has all of the above features plus a digital meter that can read both volts and amps. With the meter set to volts, you can manually peak-charge a battery pack: hold the pack in your hand and when it reaches full charge, you'll see the voltage start to go down (rather than up), and you'll feel a sudden rise in pack temperature.



800 AC/DC Quick-Charger

No. HCAP0120 • \$39.95

This budget-priced charger is very simple to use. Just plug it into any AC or 12V DC supply and plug in a fully discharged 6- or 7-cell pack, and the Quick-Charger will do the rest. It automatically kicks into the quick-charge mode and fast-charges the battery pack for approximately 30 minutes (via a preset internal timer). At the end of this time, it switches over to the trickle-charge mode.

HORIZON HOBBY*



Dynamite's Mega 1

No. DYN4010 • \$41.95

Dynamite's Mega 2

No. DYN4020 • \$49.95

These budget-priced chargers operate on 115V AC and 12V DC. The Mega 1 has voltage-

output jacks for an external digital voltmeter. This allows you to use the voltmeter to monitor pack voltage during charging. The Mega 2 has a built-in amp meter and a neat discharge features that lets you dump your packs after each run so that they'll accept a full charge on the next cycle. Discharging a pack also helps prevent the possibility of overcharging when using timer chargers. Overall, they're a lot of charger for the dollar.

MODEL RECTIFIER CORPORATION (MRC)*



MRC RB-465 AC/DC Quick-Charger

\$61

This charges a standard 6-cell 1200 to 1700mAh battery pack. It has quick-charge, trickle-charge and discharge modes. It also has a built-in charge/discharge current meter. To check battery capacity, set the 15-

minute timer to start the discharge cycle, and note how long it takes for the discharge current to drop to 2 amps or less. The charger does not have a current-level control, but its preset current level will safely charge a completely discharged battery pack in 20 minutes. To do this, set the timer to 15 minutes. After the battery has charged for 15 minutes, check it to see if it is hot. If not, set the timer for an additional 5 minutes and let the battery finish charging. As with any charging setup, if you find that the battery is excessively hot, stop the charging process immediately because the battery is overcharging.



MRC RB-795 AC Quick-Charger

price: n/a

This heavy-duty charger operates on 115V AC and was designed to

charge the monster Juice Packs that are used in MRC World Scale off-road trucks and buggies—usually 8-cell 2000mAh packs that are constructed from C-size cells instead of typical sub-C cells. MRC does not recommend charging anything smaller than a 7-cell 1700mAh pack with this charger.

To control the charge, set the rotary timer for up to 15 minutes. Other features include an 8.4V (7-cell), 9.6V (8-cell) selector switch, a charge/discharge switch and an 8A charge/discharge current meter.

GLOBAL HOBBY DISTRIBUTORS*



Pro-Max AC/DC Auto Charger

No. 885590 • \$46.95

This charger can be operated from a car cigarette lighter or from standard AC power, and it charges 6- and 7-cell packs. The time settings for any battery capacity from 500mAh to 1700mAh are listed in the instructions. The charger automatically

goes to trickle-charge when the timed quick-charge is over. This workhorse should work well for any beginning R/C driver.



Pro-Max AC/DC Quick-Charger

No. 885600 • \$52.95

This charger is the same as the 885590, but it has a built-in amp meter and a discharge circuit.

PEAK-CHARGERS

ASTRO FLIGHT*



110D Peak-Charger DC
\$159.95

Anyone who is into high-voltage R/C sports should check out this charger; it charges up to 18 cells in the same time it takes to charge a 6- or 7-cell pack.

It uses an 8-bit, proprietary microprocessor to ensure fool-proof peak-charging and to drive a two-line display. With computer power on board, its functions are virtually limitless! When you first plug the 110D into a 12V source, it flashes the Astro logo and then displays the message "No Battery." The unit that Astro Flight sent me also flashes the words "Property of John Rist"—a result of the personalized message feature. I talked to the owner of Astro Flight—Bob Boucher—and learned that this is a \$20 option available from the factory (3 to 4 week delivery). When you connect a Ni-Cd battery pack, the display flashes one of two messages: "Overvolts Error" if the battery pack voltage is above the 29.5V maximum; "Ready to Charge" if the Ni-Cd pack's voltage is between 0.5 and 29.5 volts.

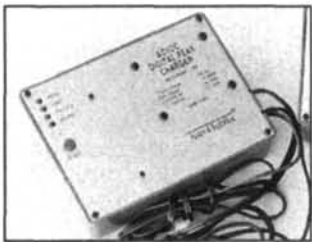
A press of the start button kicks the 110D into the trickle mode. The display now shows charge current, "slow" (meaning slow-charge mode), elapsed charging time, and the charge placed back into the battery expressed in amp hours (Ah). The 110D trickle-charge mode is a true peak-charge mode. This makes it very useful for charging receiver packs and for placing the first charge on a brand new racing pack. If, for some reason, the charger does not detect a peak, it will termi-

nate the slow charge at the end of 5 hours.

Press the start button again and, if in the trickle mode, the 110D will jump into the fast-charge mode. In the fast-charge mode, the current can be adjusted to between 1 and 5 amps. The charger will then turn off if it detects a peak but, if it doesn't, it will cut off after 45 minutes.

At the end of either a slow or fast charge, the display gives you the peak voltage of the Ni-Cd pack at the end of charge, total charge time and total charge in Ah placed in the battery. With these three pieces of info, it is a snap to determine which of your packs is worthy of the A-Main and which is ready to be recycled.

Or maybe you just want to charge three 6-cell packs connected in series (a process that is not recommended unless you know what you're doing!). Buy the version with the custom logo, and you'll have a first-class charger that is "theftproof."



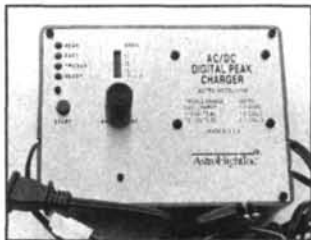
114D Peak-Charger AC/DC
\$89.95

At first glance, this appears to be a "plain Jane" charger, but don't be fooled. It's a microprocessor-controlled "smart" charger, which means its first priority is safely charging your Ni-Cds. It operates on AC and DC power, so no matter where you are, you can use this charger.

It also has an auto-off trickle-charge mode during which the charger puts out 400mA. If it detects a peak in the battery voltage (indicating full charge), it cuts off automatically; after 5 hours, it always cuts off automatically.

It also has a fast-charge mode during which the current jumps to 4.5 amps and then turns off if it detects a peak; if no peak is detected, it cuts off after 45 minutes.

Controls include a single button and a bank of LEDs that display the charger mode. This charger handles any battery pack from 1 to 8 cells and from 100mAh to 4000mAh. This covers all battery packs from receiver to monster-truck packs—goof-proof charging at its best.



115D Peak-Charger AC/DC
\$109.95

This is identical to the Astro Flight 116D charger and operates on 115V AC and 12V DC. On AC, it charges 1 to 8 cells; on DC, it charges 1 to 7 cells. The 115D has a charge rate of 1 to 5 amps making it suitable for nearly any battery pack.



116D Peak-Charger DC
\$89.95

This is identical to the 114D with two exceptions: it operates only from a 12V DC source; and it has a current-control adjustment potentiometer and a bar graph current meter. Current can be set anywhere from 2 to 8 amps. A chart in the instructions indicates which current level to use with different size batteries.

SCHUMACHER*



CCD20 Flex Charger, Cycler, Discharger DC and C20 Flex Charger DC
No. PN G828 • \$129
No. PN G826 • \$199.95

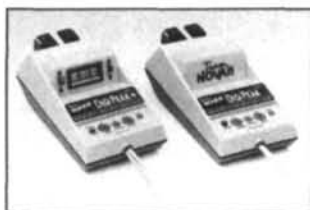
These fully automatic, flex-mode peak-chargers operate on a 12V DC supply. Flex charging is accomplished by forcing a high-current discharge pulse through the cell once every second or so to break up the gas bubbles that accumulate during a charging cycle.

In the discharge mode, these chargers dissipate a constant 20 amps—the average amount used for racing. A digital meter records the amount of time it takes to discharge the battery. If done after a race, you can accurately tell how close you were to a dump. If performed on a fully charged battery pack, you can measure the true mAh rating of the battery. Other features include an amp meter, adjustable charging rates, defective cell check and an auto cycler.

The auto cycler is a spiffy feature that automatically peak-charges and then discharges the battery pack. At the end of the process, the battery capacity can be read on the LCD display. You can set the number of charge/discharge cycles from 1 to 99.

The C20 is identical to the CCD20, but it does not have discharge features.

NOVAK*



Digi-Peak and Digi-Peak Plus DC

No. 4400—Digi-Peak • \$140
No. 4410—Digi-Peak w/fan • \$160
No. 4450—Digi-Peak Plus • \$185
No. 4460—Digi-Peak Plus with fan • \$205

These chargers charge any 4- to 8-cell pack at a rate of 0 to 10 amps. With this flexibility, the Digi-Peaks charge everything from receiver packs to monster packs for world scale cars and trucks.

The Digi-Peaks have three modes of charging: pulse mode—0 to 10 amps; linear mode—0 to 5 amps; and trickle mode—0 to 0.3 amps.

To prevent false peaking, the Digi-Peak chargers have a lockout time of 100 seconds. When a fully discharged battery is first placed on a charger, its output voltage sometimes does funny things that can cause a false peak. The Digi-Peak ignores these variations for 100 seconds, giving the battery pack time to settle down. Also,

Novak boasts of a very precision 10-bit, digital peak-detection circuit that guarantees a true full charge without overcharging.

The Digi-Peak Plus sports a built-in LCD volt/amp meter.



Rhino DC

\$112.50

"Nothing charges like a rhino!" The Rhino is Novak's lowest-priced charger, but it does not lack features. It uses Novak's super-accurate, 10-bit, digital peak-detection circuit. It can handle 4 to 8 cells at 0 to 10 amps and covers all charging needs from receiver packs to 8-cell monster packs for very large trucks. It also sports a built-in fan with a replaceable filter.

Current level is controlled by a calibrated knob, and output voltage and current can be monitored by an external voltmeter. So, connect a battery, push the start button, and the Rhino will do the rest.

COMPETITION ELECTRONICS INC.*



TURBOthirty DC

\$529.95

To call the TURBOthirty just a battery charger would be doing it a great disservice. A more appropriate name would be "microprocessor-controlled battery conditioner and test lab." This charger charges, discharges and cycles battery packs from 1 to 7 cells at up to a 12A rate. It also runs motors or a comm lathe.

But, most amazing of all, it automatically cycles a single cell with "setable" charge and discharge rates, and cutoff voltages. At the end of the cycle, it reports the cell capacity in mAh, the peak-charge voltage, average discharge voltage and cell resistance. This is the information that the big guns use to match their cells for race-winning battery packs. With this machine, you build your own

killer matched packs.

Another interesting feature of the TURBOthirty is its re-peak feature. To control the amount of pack warm-up, you can set different charge rates for the main and re-peak charges. You can set how hard it re-peaks a battery pack to control the amount of pack warm-up. It also has peak-detect lockout that fully charges battery packs that have a tendency to false peak; the lockout can be set between 60 seconds and 10 minutes.

The TURBOthirty also has "the buzz-box mode," which places a super voltage peak on SCR cells. The manufacturer warns that this mode should be used sparingly because, although it boosts cell voltage to the max, overuse can cause the cell to vent, which diminishes its capacity.

With the TURBOthirty, every parameter of battery charging and discharging functions can be set and stored for future use. If you're serious about big-time racing, the TURBOthirty is for you. The unit may seem a little pricey, but compared with the cost of professional battery matching equipment, it's probably a good buy!

HOW TO CHARGE THE RIGHT WAY

The most important rule is don't overcharge. Overcharging does not put more juice in a battery, it just makes it very hot.

If you're heavily into racing, it is best to have at least one battery pack for each heat and the Main. For most races, this means four packs. I also recommend that you test your batteries and grade them from strongest to weakest. I do this by discharging fully charged batteries using a constant current of 20 amps and timing how long it takes for the voltage to drop to 0.9 volts per each cell. The pack with the longest time is the best. I label the packs and keep records so that next time I test a battery, I can see if it's OK, or if it's ready for retirement.

Light bulbs, a resistor, running in a car, or a charger that has a discharge feature, all are acceptable ways of discharging a

pack. I like to give my racing packs at least two to six days rest, fully discharged, between races.

The actual charging for a big race starts the day before the race. I charge the four battery packs on my peak-charger (one at a time!) at about 2 amps. At this rate, it takes about 30 minutes to charge a pack. I use this slow rate because I am not in a hurry and the slower rate causes less internal heating. Also, if you read the original spec sheets on any Ni-Cd cell, you'll see that manufacturers never recommend charging a battery pack in 15 minutes. They generally consider a fast charge to be 1 hour and list the normal charge rate at 12 to 24 hours. But, with charge times of 15 minutes being common in our hobby, 30 minutes seems to be a good compromise.

On race day, I sort the packs from worst to best. I race my worst pack first, and then as the day progresses, I use a

stronger pack for each successive heat. Of course, I save the killer pack for the Main (hopefully the A-Main). This way, I can up the gearing as the race day progresses, without the fear of having a battery pack dump in the middle of a race.

When it gets close to the start of my heat, I place the battery pack on my peak-charger and charge it at 4 to 4½ amps to bring its voltage to its peak. During this "re-peaking" process, you should monitor the pack's temperature. It's OK for the pack to get slightly warm, but if the pack starts to get hot, take it off the charger immediately.

A digital voltmeter comes in very handy when peak charging, as it allows you to monitor voltage precisely. During a typical charge cycle, the pack's voltage will climb rapidly as it reaches its peak. When the voltage stops climbing and begins to actually drop off slightly, the pack is done and should be removed from the charger. Some chargers have built-in voltmeters which simplify this process greatly.

WHICH ONE IS BEST?

I haven't done a hands-on test of all the chargers discussed in this article. I gathered my information from manufacturers' press releases, fact sheets and copies of the instruction sheets. For this reason, my picks are solely based on features and price. But thanks to today's improved standards, every charger is very good.

Best of the Best

My pick for best of the best, regardless of cost (\$529.95), is Competition Electronics Inc.'s TURBOthirty—a true, lab-grade, cell-matching instrument. It comes with a heavy-duty holder for single cells and has settable charge and discharge rates, cut-off voltages and a number of charge/discharge cycles. It provides you with the same set of numbers that are printed on those expensive matched packs that seem to give racers the edge. It won't create super cells out of thin air, but it will let you sort all your cells into matched packs.

This charger also cycles whole packs, providing you with true data on the health of a pack. Yesterday's race-winning pack may have a dead cell. On race day, the TURBOthirty acts as one mean do-it-all charger. After the race, it will discharge the battery pack and tell exactly how much charge was left in the pack. It ain't cheap, but it sure looks good.

Peak-Charger

My second choice is the Schumacher CCD20 Flex Charger. At \$199.95, it is a very complete battery management system. It performs both charging and discharging functions and uses flex-mode charging to ensure peak battery performance. After it cycles a battery pack, it reports capacity in mAh.

High Voltage/ Numerous Cells

If you're into high-voltage insane runs or truck pulling, the Astro Flight 110D Peak-Charger charges 1 to 18 cells on a 12V DC source. I use one of these well-made chargers with my high-voltage fast electric boats.

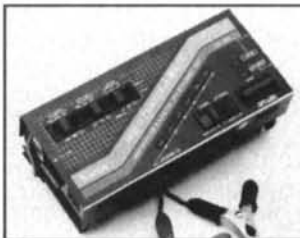
Entry Level

At \$36.95, Hitec/RCD's CG-315 Charge-A-Matic is one big bargain. It only operates on 12V DC (but so does my number-one pick—the TURBOthirty), only charges 6- and 7-cell packs, and it charges at a fixed 3.4A rate, but it is a true peak-charger and costs less than a lot of timer chargers.

Timer Charger

All the timer chargers appear to work equally well. Some have meters, and some discharge as well as charge. The one that best suits your needs at a price you can afford will be the winner for you.

HITEC/RCD*



CG-325 Multi Charge-A-Matic DC

No. PN HCG0325 • \$103.95

This is Hitec's top-of-the-line automatic charger. It has a 4- to 10-cell capacity and will charge any cell from 270mAh to 1800mAh at a rate as low as 0.9 amps and as high as 4.5 amps. Its front panel is covered with an array of switches and LEDs that lend precise control to any charging task. But the unique feature is the discharge and efficiency test system. Place a fully charged battery on the CG-325 and run it through a discharge cycle, the CG-325 will display (through a bank of LEDs) an efficiency rating. If you keep records based on this rating, you'll know which of your packs is the best (A-Main quality), and which has become too weak for racing.



CG-320 Multi Charge-A-Matic DC

No. PN HCG0320 • \$79.95

This unit is similar to the CG-325, except it charges a maximum of 9 cells instead of 10. Also, its battery-check test is less comprehensive.



CG-315 Charge-A-Matic DC

No. PN HCG0315 • \$36.95

This may well be the king of budget-priced peak-chargers. When it's connected to a 12V DC power source, just plug in your battery pack, and push the start button. The CG-315 will peak-charge, cut off and start to trickle-charge—all automatically. It doesn't get any simpler than that. Charging current rate is set at 3.4 amps—acceptable for fast-charging most 6- and 7-cell packs.

HOBBICO



930 DC

\$109.99

This is truly an easy-to-use peak-charger. It has a 4- to 7-cell capacity at a charge rate of 0 to 5 amps—a range that should charge anything from receiver packs to 7-cell 1700mAh packs.

Just connect the charger to any 12V DC source, connect the battery, and press the start button. You can then monitor the charge current on the digital volt-

meter and set it to the desired level with the current set knob.

The 930 has spring-clip battery connectors on the back, which can be attached to the (included) Kyosho and Tamiya battery adapter cables. Or you can build a custom cable with a connector to match your racing-style connector system. Those of you who direct-wire your batteries can build a set of alligator clip cables and connect them to the spring clips.

Peak chargers are convenient because they pick up any level of charge and take it to full charge. For you racing fans, this ensures maximum punch and run times, every time.

TEKIN*



**BC 112C
Pro AC/DC Charger**
\$310

This is Tekin's top-of-the-line charger. Its most outstanding feature is Power-Flex or Flex charging (see "Charging Terms") of which there are three levels: PF1—mild for fairly new batteries, PF2 and PF3—more aggressive for older batteries. Other features include peak-charging and a built-in amp meter. It is also small and light.

It charges 1 to 12 cells from 0 to 10 amps, and that means it will charge anything from a 4-cell receiver pack to a 12-cell insane class-racing pack.

If you charge a fully discharged battery pack, the BC 112C will display the amount of charge placed in the battery in mAh. Keep records so that you can tell when a pack's capacity has gone down. Then you can replenish the pack using the Power-Flex mode. Power-Flex circuitry also helps prevent memory formation if you only partially discharge your cells, and it also increases power.

A BC 112A can be plugged into the BC 112C's power supply so that you can run two chargers off one power supply at 0 to 5 amps each.



100L DC
\$110

This is Tekin's lowest-priced peak-charger. It operates on DC only, but it charges 4 to 8 cells from 0.5 to 10 amps. It also sports an output jack for an external volt/amp meter.



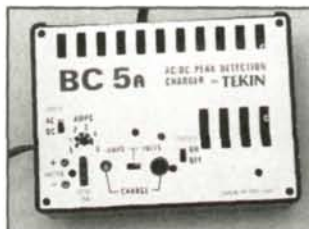
BC 48 DC
\$165

This charger is similar to the BC 100L, except it has a built-in meter that displays amps, volts, or time. It charges 4 to 8 cells from 0 to 8 amps.



BC 67 AC/DC
\$228

It's identical to the BC 48, but it also works from a 115V AC source, and it charges 4 to 8 cells from 0 to 5 amps.



**BC 5A Economy
AC/DC**
\$165

This budget-priced peak-charger operates on AC/DC and has a 4- to 8-cell capacity. It charges from 0.5 to 5 amps—a range that covers most charging needs. The charger also features a special low-amperage trickle charge mode, and includes a 15-amp fuse for added protection. It doesn't have a built-in meter, but it does have an output jack for an external volt/amp meter. The BC 5A is an extremely durable unit, and is a wise choice for a beginner on a budget.



**BC 112A
Pro DC Charger**
\$222

This charger has all the high-tech features of the BC 112C, including the three power flex charging modes, and will display the battery's charge condition in mAh but it operates on DC only. The good news is that this makes it much smaller and lighter than the BC 112C. Both chargers operate on 10 to 24V DC. For those of you who already have a 12V power supply, the BC 112A is the logical choice.

* Addresses are listed alphabetically in the Index of Manufacturers on page 192.

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Here's a sampling of the 192 entries seen at Tamiya's home track.

TAMIYA CHAMPIONSHIP U.S. NATIONALS

Parking-lot racers get their



Tamiya America President M. Tamiya was on hand to oversee the event and make sure things ran smoothly.

THE TAMIYA CHAMPIONSHIP Series U.S. Nationals, held at Tamiya America's Aliso Viejo, CA, headquarters this past June 24 and 25, will be remembered for several good reasons. To begin with, it was the first event of its kind for Tamiya, and 192 racers competed for three all-expense-paid trips to Japan. These winners will represent the U.S. in Tamiya's international competition later this year.

Also, the U.S. Nationals was held with Tamiya's annual Hobby Expo. Hobby dealers from across the nation viewed Tamiya's latest products and attended



SERIES

TIONALS

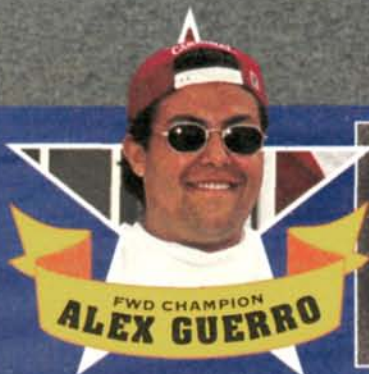
chance to show world class talent

by MIKE OGLE

PHOTOS BY MIKE OGLE AND FRANK MASH

industry seminars and an outstanding static scale-model competition.

Most of all, the event will be remembered for featuring some of the most exciting, closely matched, wheel-to-wheel racing ever seen. Competition was divided into three categories: Tamiya Formula 1 (F1) cars, 4WD sedans and FWD sedans. This race culminated an exciting year in which R/C racers from all over the world proudly referred to themselves as "parking-lot racers"—a term that has gained a certain degree of respect and sophistication of late.



From left: Tamiya America executive vice president Jim Warashina, Rick Hohwart, Richard Trujillo, Aaron Biner and Tamiya America president Mark Tamiya during the Iron Man trophy presentation.

The Iron Men of R/C

As you know, the Tamiya Championship Series is for amateurs only—meaning no fully sponsored drivers. Because Southern California is the home of so many of the top names in the R/C industry, Tamiya held a special competition just for them—the Iron Man category. In it, sponsored racers competed against one another in three separate racing formats: a round of Indycar oval racing, a round of sedan racing and a stint on the off-road track—all done with factory-prepared vehicles. Notable participants included Andy Jacobsen of Andy's Bodies, Don Rice of Futaba, Frank Killam of Associated and Peak Performance's Rick Hohwart.

The Indycars were particularly impressive, exhibiting some of the fastest straightaway speeds of the event. Peak's Rick Hohwart took a real liking to the open-wheel racers; his Indycar seemed to be glued to the track—a tribute to his years of expertise in 1/10- and 1/12-scale on-road racing. Richard Trujillo of Team Losi/MIP scored the most combined event points for the overall win.

It's no secret that many factory-sponsored pro drivers are closet parking-lot warriors. They enjoy their free Saturday afternoons in the low-pressure environment of just-for-fun racing, which is why they got into R/C in the first place.

Iron Man Participants

Aaron Biner—Losi, Peak Performance
Don Rice—Futaba
Rick Hohwart—Peak Performance
Randy Hunter—Peak Performance
Andy Jacobsen—Andy's R/C Products
Tony Vega—Airtronics
Sohrab Tavakoli—Losi, Peak, Novak
Richard Trujillo—Losi, MIP
Frank Killam—Associated, Airtronics
Steve Hickman—Airtronics

TAMIYA U.S. NATIONALS

QUALIFYING

Saturday, June 24, saw a long day of qualifying for the Mains, which was held on Sunday along with the "Iron Man" competition, in which industry pros competed in three formats of racing. Also held on Sunday was "Media Madness"—an exhibition-only, off-road event for the automotive and R/C press (see "The Iron Men of R/C" and "Media Madness Off-Road Challenge" sidebars).

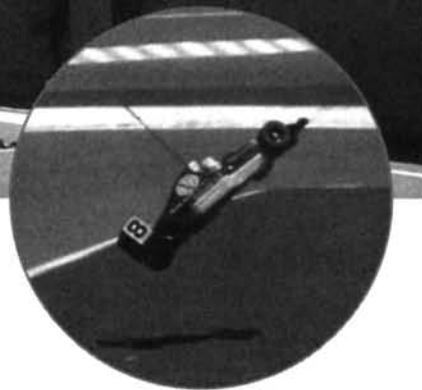
The F1 class was the most popular and fastest with 79 entries doing battle for the chance to compete in the A-Main and get a shot at the freebie trip to Japan. At the end of Saturday's action, on top was local hot-shoe David Berger—a confirmed F1 fanatic whose 19-lap, 5:08.93-second qualifier edged number-two qualifier Mark Rebek. Albert Langerica, Larry Stone, Edward Garcia and super-rookie Brandon McNally rounded out the top six.

The 4WD sedans were turning some very respectable lap times, with Bob Sager's concourse-threat Opel Calibra reel-



Whoever places first in the A-Mains in the F1, 4WD and FWD classes heads off (all expenses paid) to race in the upcoming Tamiya World Championships in Japan. Right: Who says parking-lot racers don't get their fair share of air time!

ing off a 17-lap, 5:15.79 effort to put him on top of the heap, followed by Mickey Cohen's 2-second-slower 17 in 5:17.84. Richard Dee was right behind them in his Mercedes, netting 16 laps in just 5:02.70 seconds in the third round. Robert Dingemans, Bob Lourenzo and Randy



Cook all got 16 laps to take fourth, fifth and sixth places respectively.

The FWD sedans were nearly as fast as the 4WDs, with their slightly better straightaway speeds putting them almost on a par with the more sure-footed, glued-to-the-infield four-wheelers. At the end of the day, Alex Guerrero's 16 laps in 5 minutes (5:00.07) just squeaked out ahead of Dante Hernandez's 16, 5:00.81 for the top slot, followed by Steve Nguyen (16, 5:03.18) and Duan Dao (16, 5:05.12) edging Scott Ernst, Buddy Buhay, Joe Houda, Roy Alaam, Hobie Kaptan, Randy West, Justin Morgan and Tom Kahl, who all turned in 16-lap qualifiers. With the top

Media Madness OFF-ROAD CHALLENGE



As an entertaining aside to the tight, wheel-to-wheel competition going on all weekend on the roadcourse, Tamiya thought it might be nice to give members of the automotive and R/C press some "stick time" on the adjacent off-road "desert" track. Media members were invited to defend their magazine's honor by driving factory-built, IROC-style, 4WD, off-road trucks in competition with other magazine writers and editors.

It was an interesting concept to get the editors of full-size automotive magazines at the wheel, considering that a few of them had never driven an R/C car before, much less on a track with people watching!

As you might expect, the representatives (ringers) from the R/C magazines walked off with the top half of the field, with *Car Action*'s grand poobah Frank Masi whoppin' it to Ron Ponce of *R/C Model Cars*, Mike Velez of *Xtreme R/C* and Mike Lee of *RCM*, leaving Doug Kott of *Road & Track*, Jeff Bartlett of *Motor Trend*, Larry Saavedra of *Sport Compact Car*, Fast Eddie Sharoian of *Truckin' Magazine*, Dudley Wakamatsu of *EuroSport Car* and me to fill the remaining slots just above a perplexed George Zombakis of *Model Retailer*—a hobby-industry trade publication.

Was it good, clean, no-nonsense racing? It certainly was not! Spectators were entertained most of the 5 minutes by the sometimes heroic, but mostly pathetic on-track struggles as the media reps used a combination of involuntary body language, silent swearing and drivers'-stand taunts to attempt to gain the competitive edge on the loosey-goosey dirt track. It was, however, a real blast for almost everyone involved and a great way to expose R/C racing to a wider audience via the full-scale automotive press.



During a break in the action, Tamiya's David Jun rolled out a few of the big rigs and started up a little "Tamiya convoy" of his own.

dozen qualifiers all on the same lap. This category was way too close to predict any winner. We just had to wait until Sunday to see what would happen.

Of course, one of the highlights of the event was the impressive concourse lineup. Tamiya is world-renowned for its realistic, true-to-scale kits, so the level of competition was exceptional. David Berger's high-

ly detailed and obviously very fast Footwork Mugen/Honda was judged the best of the F1s with its detailed driver figure, nose-mounted telemetry antennae, rear-view mirrors and simulated carbon-fiber, front-suspension struts catching the judges' approval. Bob Sager's Opel Calibra was deemed Best Appearing 4WD, and Jay Thompson's Calibra won Best Appearing FWD.

SUNDAY SEMIS

In the F1 class semifinal, Mark Rebek's 5:11.19 won him a spot in the main event. Larry Stone and Brandon McNally also bumped up with second- and third-place finishes. Richard Dee improved on his previous day's best with a 17-lap, 5:01.69 in 4WD to take the semi ahead of Mickey Cohen and Bob Sager. Dante Hernandez also picked up speed with 17 laps in the FWD semifinal.

THE MAIN EVENTS

The first Mains on Sunday were for the 4WD class. Richard Dee's 17-lap, 5:01.69 in the semis held up as the best time of the event, and this landed him the pole position in the A-Main. In fact, the number 17 proved to be significant for Richard on this day (you'll soon learn why!).

The on-track battle of Richard Dee and number-two qualifier Mickey Cohen caught everyone's attention. Richard was hard-pressed to fend off Mickey's repeated challenges throughout the last half of the 5-minute A-Main. Richard piloted his TA02 chassis ProMarkt Mercedes with what the Germans might refer to as a "Bahlzout" driving style, turning 17 laps in 17 seconds past the 5-minute mark, just a few car lengths ahead of Cohen. It was such a close, exciting battle that it made you wish for some way to



One F1 car out of 79 in the field would be making its way overseas to compete in Tamiya's International Championships.

make both of these guys winners.

But wait, Richard is only 17 years old; therefore, he's ineligible for the trip to Japan. Well, he's still the official winner of the Tamiya National Championship, but guess who's going to go to Japan? That's right, second-place-finisher Mickey Cohen, whose fine 17-lap, 5:18.52 put him just ahead of third-place finisher Bob Sager, who also got 17 laps in 5:22.80.

The F1 Mains were held next, and let's just say that the first few turns of the race were hazardous, with several edgy racers choosing to swap their batteries' peak-charge for some of their competitors' paint. Pole-sitter Mark Rebek was hunted down by D.J. Renwick, who slipped by Rebek to finish fourth in 5:03.36. Larry Stone took third in 5:14.21, Brandon McNally wound up in second with a fine 5:12.69, and David Berger won with a 19-lap, 5:08.12—his best performance of the event.

Dave is obviously a real-life, hard-core F1 enthusiast and a complete R/C racer. At the start of the event, racers were looking over every square inch of his beautifully detailed Footwork Mugen/Honda, but, by the end of the A-Main, they all found themselves just staring up the Footwork's tailpipes. Congratulations, David, I hope your competitors in Japan enjoy the same view!

The last races were the

FWD Mains, and although I really expected them to be sort of anticlimactic after the quicker, more nimble F1s, I couldn't have been more mistaken. Top qualifier Dante Hernandez looked like a good bet for the win, and he actually led a good part of the



Note the matching paint schemes.

race, but not the part that would land him in Japan. Alex Guerrero, starting way back in the pack, slowly—no, make that agonizingly slowly—worked his way through heavy traffic. Alex, who claims to be strictly an off-road racer, eventually began to reel in Dante and finally squeaked by him in the very last turn! The crowd was on its feet for the last few seconds of the race, cheering him on in between fingernail bites to a $\frac{5}{100}$ second (.05) margin of victory! It was a great finish to the event and a great display of driving nerve by Alex—a nice guy who finished first.

Congratulations to all the participants in Tamiya's first-ever R/C Championship Series, to Tamiya America for undertaking such a large event and, of course, to David Berger, Mickey Cohen and Alex Guerrero. Look out, world! Here comes America's team!



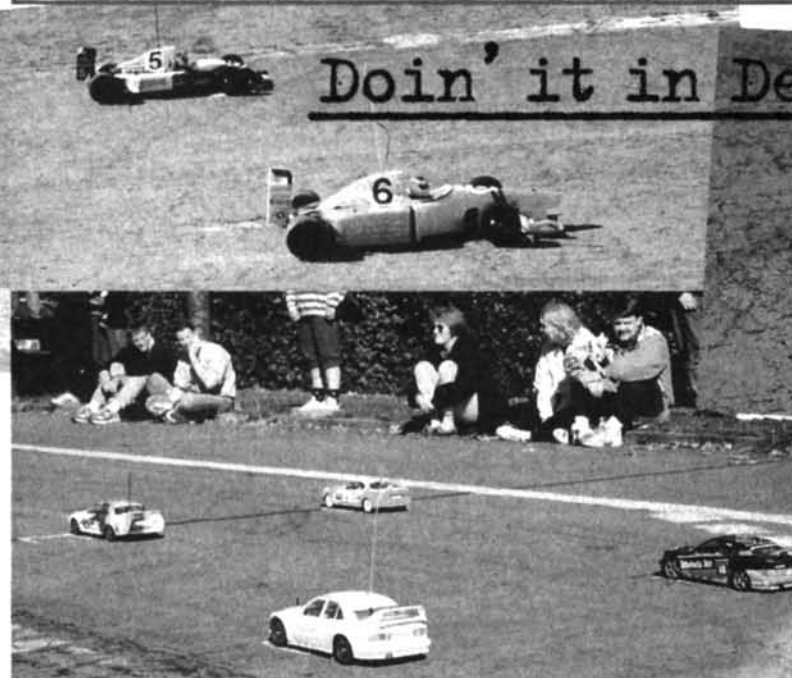
Even though Richard Dee won his race, he had to forfeit the trip to Japan because he was only 17 years old. Unfortunately for Richard, the rules stipulated that you have to be 18 years old to be eligible to go to Japan.

From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots RACING

This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at *Car Action* really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.

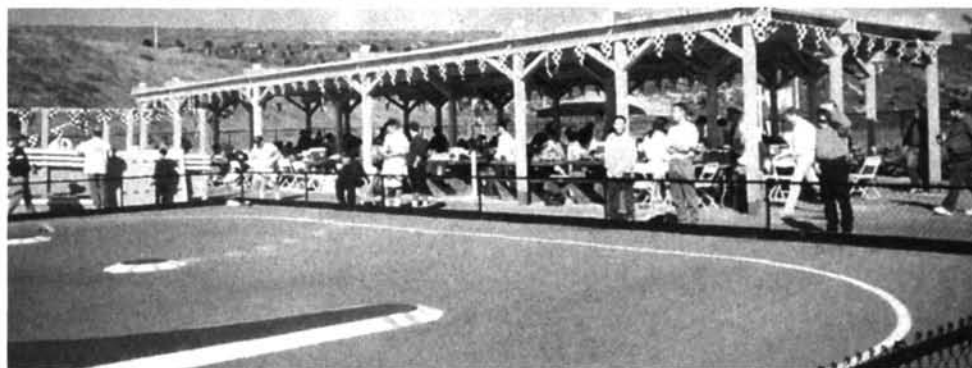
Doin' it in Denmark



If you're ever in Roskilde, Denmark, and you get the urge to race, just look up Hayward Butler Jr. He and his buddies race F1 and DTM cars, and there are only a couple of rules to follow: you must run pneumatic rubber tires, and you can't run motors with ball bearings. Here's just a sample of the type of competition you'll find.

TAMIYA TIME

A crowd of interested spectators gathered to watch the 99 racers who took to Tamiya's test track in Aliso Viejo, CA, for a laid-back day of F1- and Sedan-class racing.



Left: it's a Kodak moment for the winners of F1 Modified. Above: Tamiya's world-class racing facility features both this on-road track and an off-road track. They share this state-of-the-art pit area; what more could a racer ask for?



And the winners are...

F1 Stock

1st—Dave Berger
2nd—Top Prokop
3rd—Robert Saldivar

F1 Modified

1st—Steve Hickman
2nd—Dave Gestoso (sponsored)
3rd—Albert Langarica

Sedan Stock

1st—Dante Hernandez
2nd—Mickey Cohen
3rd—Tom Kahl

Sedan Modified

1st—Frank Killam (sponsored)
1st—Richard Dee
2nd—Steve Nguyen
3rd—Bob Sager

Top F1 Rookie

Brandon McNally

Best of Show F1

Fred Medel

Top Sedan Rookie

John Houda

Best of Show Sedan

Mike Dunn

*Note: in races where a sponsored class driver places, prizes go to the next fastest driver.

call now!

Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series

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Tamiya R/C Championship Series

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Kyosho R/C Sport Racing

(800) 682-8948
ext. 085F

Hobby Shack Parking Lot

(714) 964-8846

Hobby Town USA Parking Lot

(402) 434-5050

Trinity's Street Spec Series

(908) 862-1705

And...Action!



Grab your parking-lot pounder and get in on the action at Action Hobbies in Tulsa, OK. They host closely matched parking-lot races every two weeks on Sundays for Tamiya 4WDs, FWDs and GTPs. For more information, call Dave at (918) 663-8998.



Clockwise from left: the "in crowd"—Action Hobbies' regular parking-lot racing group; the 60x130-foot track features interior barriers made of vinyl guttering; Steve Smith's 4WD arsenal and an old Road Wizard!; Jim Scott's winning FWD.

TRACK or TREAT?!

Hidden in the foothills of the Blue Ridge Mountains, Virginia's Fairystone Radio Control Speedway lies in wait for unsuspecting R/C'ers. Only the bravest racers in search of fun are allowed to participate in the crazy antics that are offered! Race here, if you dare!



Fairystone's most popular event is the "World Figure-8 Championships." As the name implies, you race around the dirt track, which is laid out in the shape of an "8." As the race progresses, the event becomes a wild game of "chicken" at the intersection. Speaking of chickens, don't be alarmed when you're asked to strap a raw egg to the roof of your vehicle; it's just time for "The Egg-molition® Demolition Derby." The object is to break the other racers' eggs any way you can. The last racer running with an unbroken egg is the winner.

Clockwise from top right: "The Bag Race"—racers use navigators to negotiate the speedway. Hey! No peekin'!; the scorer takes a coffee break (it's not easy bein' green!); the winners of the "Goblintown 500"; Charger Race champs Chris Ross and Elton Sideburn; feature event trophies and prizes; champ James Meredith signs in at the inspection desk. For more information on how to join in the fun, contact Pat Moon Jr. at (540) 930-3984.



TECH HEAD

by Frank Masi

Ride Height and Unexplained Noises

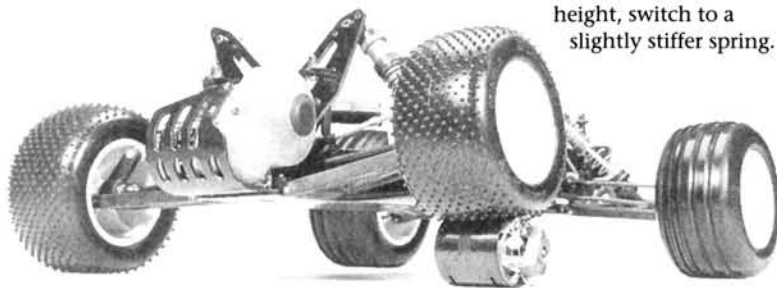
We received a great letter from a reader who was having trouble getting his first off-road R/C vehicle (an Associated RC10ST truck) up and running. This month's column is dedicated to answering his questions about ride height, shocks and unexplained noises. So, without further ado....

1 "Ever since I built my RC10ST, the rear shocks have been sinking because of the weight. I changed the oil from 40 to 80WT, and it didn't help. Should I get firmer springs?"

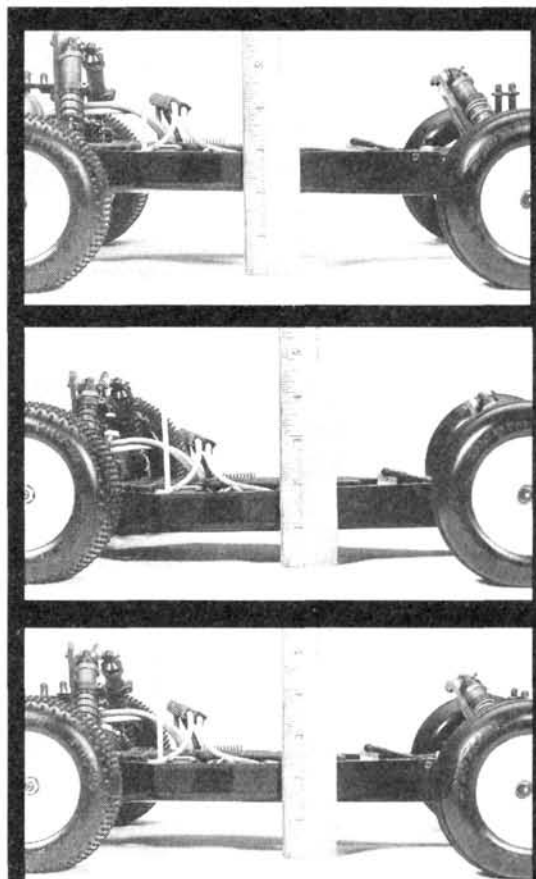
If you've built everything right, the rear shocks *should* sink a little because of the vehicle's weight. You don't want the vehicle to sit too high off the ground.

In order for the suspension to do its job properly, it must be able to move up to compensate for bumps and down to compensate for small holes. To make this happen, set the vehicle's ride height, i.e., how high the chassis sits off the ground, to a point that's somewhere in between the shocks being fully compressed and fully extended.

The only thing that controls ride height is the tension of the springs. The type of oil you use in the shocks does little to affect ride height. Set the spring tension by adjusting the small, clamp-like collars on the shocks. There will be times when you have to switch to firmer springs. For example, sometimes, if a spring is too soft, you'll have to compress it too much in order to get the proper ride height for the vehicle. The rule of thumb is: if you have to compress the spring by more than 25 percent of its length to achieve the desired ride height, switch to a slightly stiffer spring.



Suspension must allow the vehicle's wheels to drop into small depressions as well as rise to clear small bumps, as shown above.



SETTING PROPER RIDE HEIGHT

Top: this truck's ride height is set too high. If you ran your truck like this one, its wheels wouldn't be able to drop into depressions and holes in the track surface and, because of its high center of gravity, it would flip easily.

Middle: here, the truck is set too low. Not only would its chassis scrape on the ground constantly but, because the suspension is almost totally compressed, the truck would bottom out on every jump and wouldn't be able to cope with even the smallest hills and rises.

Bottom: now that's more like it! The ideal ride height setting is right in the middle—not too high and not too low. Now the wheels can drop into small holes in the track and cope with larger jumps and hills without the car bottoming out.

2 "I read the article on shock secrets (September '95), and I followed it. When I ran my truck, the dogbone on the right side slipped out. Then I switched the shocks back to the original place, and the problem stopped. Could changing the shock position do that?"

Any time you lose or bend a dogbone or a drive shaft, it's almost always because the rear suspension arms have moved too far in one direction. For example, if the arms are allowed to drop too far, the dis-

tance between the transmission outdrive and the rear stub axle will increase to a point greater than the length of the dogbone. The result?—instant dogbone ejection.

This is what has hap-

pened to your vehicle. Whenever you change the shock's mounting location, make sure that you don't alter the amount of suspension arm travel in the process. Usually, when you move the shocks to a position that's farther inward toward the center of the vehicle, you'll have to place travel limiters inside the shocks to shorten them and maintain proper arm travel.

I've found that the plastic washers that come with many of the popular kits make great spacers. Just slide the desired number of spacers over the shock shaft before you install the shaft in the shock.

Avoid using fuel tubing as a spacer because it becomes compressed and allows the dogbone to pop out. Plus, it's almost impossible to make two pieces of tubing exactly the same length; you don't want one shock to be longer than the other—very bad!

On the other hand, if

the suspension arms are allowed to travel up too far, the drive shafts will actually get crammed into the transmission outdrives and become bent. To prevent this, place spacers on

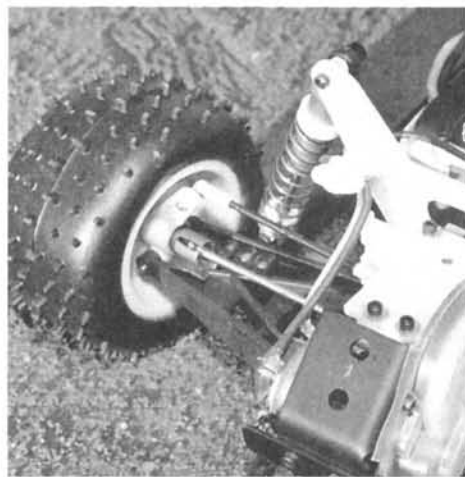
the part of the shock shaft that's outside of the shock body. Doing this will limit how far the shock will compress and how far upward the suspension arm can travel.

3 *"There's a grinding noise that sounds as if it's coming from the spur gear. I cleaned it and the pinion gear. I cleaned the transmission and the motor with a comm stick that I really didn't know how to use, and the problem still persists."*

Your particular truck (the Associated RC10ST) has separate dogbones and stub axles. If the rear suspension is allowed to extend too far (I know, we've covered this already!), the little pin on the end of the dogbone can rub against the suspension arm and produce a "clackety, clackety" noise. To fix this, simply limit the rear shock's travel a little, or trim a small amount of material off the arm to provide clearance for the dogbone pin (use a sharp hobby knife to do this).

If the pin on the other end of the dogbone is rubbing on the transmission's plastic gear cover, it can make a clicking noise. Trim a small portion of the cover to eliminate the noise.

The only other reason for the grinding noise would be badly worn or damaged gears. Inspect the spur and pinion gears for small pebbles. Open the transmission and inspect the top, middle and differential gears. If any of the teeth are sharp and pointed, they should be replaced immediately.



Sometimes, the edge of a drive axle can rub against the suspension arm during full down-travel. To remedy this, you can either limit suspension travel or remove some material from the arm.

I hope you have enjoyed this little deviation from "Tech Head's" standard format. As always, if you'd like to see a particular topic covered, send your comments or suggestions to: Tech Head, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897; e-mail: frankm@airage.com. ■

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CLASS: (circle one) **2WD:** ST MOD & NOVICE **4WD:** ST MOD **M.T.** ST MOD **GAS TRUCK**

2WD FREQUENCY: 1ST _____ 2ND _____ 3RD _____

4WD FREQUENCY: 1ST _____ 2ND _____ 3RD _____

M.T. FREQUENCY: 1ST _____ 2ND _____ 3RD _____

7TH ANNUAL PEAK PERFORMANCE OFF-ROAD GRAND PRIX

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Associated Electronics, 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

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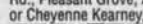
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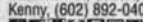
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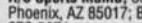
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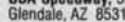
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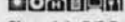
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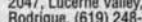
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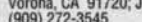
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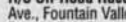
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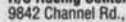
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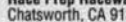
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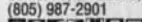
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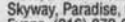
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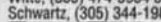
Broward County R/C Race Club, Mills Pond Park, Ft. Lauderdale, FL; Ed Augusto, (305) 525-3304



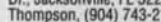
Challenger Sedway at the Willows, Willows Park & Okeechobee Blvd., Royal Palm Beach, FL 33414, Walt (407) 965-2790, or Mark (407) 790-6917



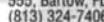
Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; Randy Witte, (305) 474-5934 or Rick Schwartz, (305) 344-1983



First Coast Speedway, 6410 Waltho Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161



5-Fifty-5 R/C Raceway, State Road 555, Bartow, FL 33830; Chuck Nolke, (813) 324-7406



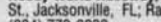
Greater Orlando Auto Racers, 970 Keller Rd., Altamonte Springs, FL 32714; Dave Mottin, (407) 263-4819



Hudson's R/C Raceway, 590 Madeore St., St. Augustine, FL 32095; Steve Hudson, (904) 826-4050



Hobby World Raceway, 7273 103rd St., Jacksonville, FL; Ray or Greg, (904) 772-9022



Lake Whippoorwill International Speedway, 12345 Narcossee Rd., Orlando, FL 32827; Bob Hosch, (407) 277-9586; fax (407) 277-2568



Louie Burton's R/C Raceway, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (813) 665-1322



Morris Kohl's Raceway & Hobby, 1107 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626



My Rose, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (407) 744-3800



NORRA, 3300 Santa Barbara Blvd., Naples, FL 33942; Jerry Pecar,

Southwest Florida R/C Raceway, 2425 Rivers Rd., Naples, FL 33964; Clyde Armstrong, (813) 455-1143






Tampa Bay R/C Club, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744



Three Flags R/C Racetrack, 1755 East S.R. 44, Wildwood, FL 34785; Don Meares Sr., (904) 748-3870; fax (904) 748-5263



Treasure Coast R/C Club, 4931 Oleander, Fort Pierce, FL 34982; Lou, (407) 464-3207




Winterset Raceway, 5272 U.S. 27 South, Sebring, FL 33870; Mack Mixer, (941) 385-2452



West Coast R/C Club, Lake Park, 17203 N. Dale Mabry, Tampa, FL 33549; Alex, (813) 920-7448; Bert, (813) 654-2554



GEORGIA

Carnesville R/C Speedway, Hwy. 145 S., Carnesville, GA 30521; Bill or Georgia Austin, (706) 335-9044 or 335-3381




Chafee Park Raceway, 1800 Pearl Ave., Augusta, GA 30904; Darren Brooks, (706) 738-8929



Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699




Echeconnee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson/Cliff Kline, (912) 788-8731



Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912) 354-0098



PDQ Raceway & Hobbies, 341 Senola Rd., Peachtree City, GA 30269; Richard Burdett, (404) 631-1788



The Racer's Edge, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls, (706) 648-2637



Ronnie's Hobbies, 17050 Jimmy Carter Blvd., Norcross, GA 30092; Gregg Mundkowsky, (404) 246-0808



Sandy Cross Speedway, Rt. 1, Box 1071, Hwy 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573



SHILOH R/C Raceway, 6362 Shiloh Rd., Hahira, GA 31632; Doug Burnett, (912) 794-2507



Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; M. Bradshaw, (404) 991-2225



KEY TO SYMBOLS

-  Indoor
-  Outdoor
-  Off-road
-  Oval
-  Dirt oval
-  Carpet
-  Concrete
-  Asphalt
-  On-site hobby shop
-  AC power
-  Auto lap-counting
-  Food available

Sugar Bowl R/C Speedway, 5272 North Ave., Sugar Hill, GA 30518; Shelley or Jan Bailey, (404) 945-6709



Valdosta Hobbies, 950 N. St. Augustine, Valdosta, GA 31601; Ron Hood, (912) 244-2101



HAWAII

Garden Isle R/C Racers, P.O. Box 3593, Lihue, HI 96766; Eric Leano, (808) 246-8856



Mau R/C Racing Association, 430 Hookahi St., #13, Wailuku, HI 96793; Tritic R/C Hobbies, (808) 244-0526



Radio Control Hawaii, 474 Kalanikoa St., S-104, Hilo, HI 96720; Glenn Shiroma, (808) 935-5629



Team PRC Racing Club, 176 Mamo St., Unit G, Hilo, HI 96720; Charlie Kawamoto, (808) 935-3561



IDAHO

Capital Dirt Burners, 1945 N. Teare Ave., Meridian, ID 83642; Jim Brandon, (208) 888-7079



Falls Hobbies & R/C Raceway, 1515 Northgate Mile, Idaho Falls, ID 83401; (208) 529-8650



ILLINOIS

Ameri-Trac, RR 3, Box 242, Mattoon, IL 61938; Ben or Judy Giles, (217) 235-6873



AJ's Raceway, Kesslinger Road, Dekalb, IL 60115; A.J. Schultz, (815) 756-2772



BARR, 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615



B.G. R/C Racing & Hobbies, 56 E. Ferguson, Wood River, IL 62095; Ben or Judy Giles, (618) 254-6301



C&R Hobbies, 39 E. Jones, Mifflord, IL 60953; Ray Craighead, (815) 889-4073



Cedarville R/C Speedway, 430 W. Washington, Cedarville, IL 61013; Troy Pokoj, (815) 745-2885



Central Illinois Max Track, 1013 Iowa St., Ashmore, IL 61912; Josh Carter, (217) 349-8824



Diehard R/C Raceway, 300 N. Main, Kewanee, IL 61443; Dick Jennings, (309) 852-3700



Hobby Town Raceway, 4611 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth, (815) 344-1777



Leisure Hours R/C Raceway, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)



Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311



Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441



Miley Motor Speedway, 1109 N. Bloomington St., Rte. 23, Streator, IL 61364; Doug, (815) 672-4212



Money R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597



Peoria R/C Raceway, 518 Hillsdale Ave., Peoria, IL 61604; Ray Tighe, (309) 672-1780



R/C Workshop, 3100 S.W. Adams St., Peoria, IL 61605; Al Kretz, (309) 673-4860



Racing Time, 6012 S. Archer, Chicago, IL 60632; Brad or Gino, (312) 767-0773



Radio-Active Raceway, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim, (708) 759-7557



Redline Raceway, 921 Harding, Calumet City, IL 60409; (708) 862-8181



Shiloh Eagles Superspeedway, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030



SIRCAR Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885



Slot and Wing Hobbies "Race Place", 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920



Stanton Hobby Shop Inc., 4718 N. Milwaukee, Chicago, IL 60630; Tim Copeland, (312) 283-6446



Superior Raceway, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073



Super Stock Speedway, 54 Bonnenstiehl Rd., Collinsville, IL 62234; Thomas Smith, (618) 632-2615



Valley Farms R/C Raceway, 706 Bypass 20, Cherry Valley, IL 61016; Dean or Debbie, (815) 332-4516 or (815) 547-5984



Wayne's World Raceway, R.R. 1 Box 246A, Danville, IL 61832; Wayne Henk, (217) 446-3419



INDIANA

Autograph/Race World, 231 Pendleton Ave., Pendleton, IN 46064; Sam Mudd, (317) 778-3386



Dave's ATVs, Hobbies & Raceway, 3035 English Ave., Indianapolis, IN 46201; Dave Sutton, (317) 767-9641



Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901; (317) 452-0163



Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773



K&L Hobbies & Raceway, 3275 North 525W, LaPorte, IN 46350; (219) 324-0353



Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (317) 457-5060



Main Hobbies, 625 Columbia, Lafayette, IN 47901; Randy Palmer, (317) 742-2045



Maple City Speedway, 1651 W. Franklin St., Elkhart, IN 46516; Pete Russell, (219) 293-1827



P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666, fax (812) 332-0018



RC Barn, 310 N 125 W, Monroe, IN 46772; Mark Lengerich, (219) 692-6600



R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



Racer's Choice Raceway, State Rd. 256, Jefferson Co. 4-H Fairgrounds, Madison, IN 47250; Eric Burns, (812) 866-5521



Rimfire Raceway and Hobby Shop, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288(shop), 987-2803(home)



The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



IOWA

Delb's Speedway, 423 11th Ave. So., Clinton, IA; Rustis Hobbies, (319) 243-2697



Dubuque R/C Speedway, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736



Hobby Haven, 7672 Hickman Rd., Des Moines, IA 50322; Jim, (515) 276-8785



M&M Racetrack, 2434 Pilgrim Path, Oskaloosa, IA 52577; (515) 673-6265



Manly R/C Club, Box 23 (Hwy 65), Manly, IA 50456; Bruce Hill, (515) 454-2025



Mr. Car Raceway, P.O. Box 1112, Central Iowa Fairgrounds, Marshalltown, IA 50158; Jim Gossett, (515) 483-2234



Radio Control Raceway Park, 746 South 30th St., Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780



Sibley Raceway, Osceola County Fairgrounds, Sibley, IA 51249; Allen Reck, (712) 754-2604



Southwest Iowa Hobbies 'n' R/C Raceway, 204 S. Broadway, Red Oak, IA 51566; Debbie Johnson, (712) 623-5513



Wild Bill's Raceway, 901 W. Jones, Knoxville, IA 50138; William Anderson, JR., (515) 842-5973



Yukon's R/C, 18517 275th St., Waucoma, IA 52171; David Franzen, (319) 778-2793



KANSAS

Dave's Hobbies & Things, RR2, Box 150, Cherryvale, KS 67335; David Carey, (316) 336-3683



Hobbytown USA, 2016 W. 23rd, Lawrence, KS 66046; Kevin Augustus, (913) 865-0883



M&M R/C Superspeedway, 2400 Broadway, Parsons, KS 67357; Mark and Melissa Brown, (316) 421-6742 or (316) 421-5006



R/C Superspeedway & TQ Pro Shop, 14 E. Ave "A", Hutchinson, KS 67501; Joe Jandrakovic, (313) 665-6633



R/C World Raceway, 217 Brownie Ave., Scranton, KS 66537; Corky or Pam Green, (913) 793-2313

PRO-LINE TRACK DIRECTORY

R/C Hobbies & Speedway, 16 Rio Way, Fairhaven, MA 02719; Toni or Roy, (508) 991-5040
FOUR

Speedworld Hobbies, 134 Water St., Wakefield, MA 01880, (617) 245-3922
FOUR

West Street Hobbies, 114C Main St., Medway, MA 02053; Jim, (508) 533-1231
FOUR

MICHIGAN

Akright Outback Racing, 984 Zimmer Rd., Williamston, MI 48895; Steve Akright, (517) 655-4531
FOUR

Capital Area Racing Society, The Plumbers Hall, 5405 S. Logan, Lansing, MI; Dave Halsey or Brad Smith, (517) 646-8224 or (517) 484-4028
FOUR

Chatter Box Racing, P.O. Box 164, Old Stage Rd., Central Lake, MI 49622; Bill Altergott, (616) 544-9829
FOUR

Doug's Dirtway, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 723-3368
FOUR

JJ's R/C Speedshop, 5713 13 Mile Rd. (corner of 13 and Mound), Warren, MI 48092; (810) 977-0420; fax (810) 977-7290
FOUR

JT Hobby and Speedway, 825 Golden Ave., Battle Creek, MI 49015; Jerry or Dan, (616) 965-0571
FOUR

Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654
FOUR

MCRC Raceway, 4601 Page Ave., Michigan Center, MI 49023; Sam Sprang, (517) 787-9161
FOUR

Newberry R/C Raceway, RR 3 Box 2860, McMillan, MI 49653; Dustin Hart, (906) 293-3044
FOUR

Pointe R/C, 2119 Summerton Rd., Mt. Pleasant, MI 48858; (517) 773-5711
FOUR

R&L Hobbies, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744
FOUR

Rainbow Gardens, 600 North Shore Ave., Crystal, MI 48818; Mike or Sandy, (517) 235-4298
FOUR

Rider's Super Speedway, 42040 Kopperwick Rd., Canton, MI 48187; Brent Martin, (313) 981-8700 or (313) 451-5599
FOUR

Scale Racing Center, 3432 Highland Rd., Waterford, MI 48328; Larry Rossi, (810) 683-5529
FOUR

T/A Raceway, 119 N. Michigan, Big Rapids, MI 49307; Harvey, (616) 796-3217
FOUR

Vicksburg Off-Road R/C Raceway, 50201 Silver St., Vicksburg, MI 49097; Jeff Schroeder, (616) 375-8591
FOUR

Village Hobbies-n-Crafts, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374
FOUR

W.A.R.R., 1025 Gilmore Ave., Winona, MI 55987; Patrick Smith, (507) 452-6732
FOUR

Westside R/C Raceway, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Orlikowski, (616) 791-9902. (Open May through August)
FOUR

MINNESOTA

Badger R/C Raceway, 404 Tamarack St., Box 101, Badger, MN 56714; Keith Cumming, (218) 386-2001
FOUR

C/S Speedway, 312 N. Bdw., Crookston, MN 56716; Caesar Kaiser, (218) 281-6665
FOUR

Grand Rapids R/C Speedway, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751
FOUR

Greater Minnesota Racetrack, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768
FOUR

Larry's Raceway Park, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (612) 634-5246
FOUR

Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365
FOUR

Paul Bunyan Raceway, Rte. 1, Box 468, Bemidji, MN 56664; Brad Trask, (218) 243-2749
FOUR

Range Racing World R/C Speedway, 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423
FOUR

Southside Speedway, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233
FOUR

Trackside Racing, 2300 Myrtle Ave., St. Paul, MN 55114; Winton Otelie, (612) 644-3424
FOUR

Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248
FOUR

MISSISSIPPI

Fast Freddy's Raceway, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315
FOUR

Joe McFadden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFadden, (601) 483-7000
FOUR

Rural Hill Raceway, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429
FOUR

Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST
FOUR

Wheeler R/C Raceway, Rt. 4, Box 569A, Booneville, MS 38829; Doug Holt, (601) 365-3439 or (601) 842-5275
FOUR

MISSOURI

All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767
FOUR

ARC Raceway, 109 South High St., Jackson, MO 63755; Burt, (314) 243-1371
FOUR

B&L Hobbies & Raceway, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (314) 431-9444
FOUR

Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238
FOUR

Columbia R/C Trax, 1502 W. Bus Loop 70 (Exit 125), Columbia, MO 65202; Gary Phillippe, (314) 682-3993
FOUR

Extreme Edge Speedway, 119 W. Liberty St., Farmington, MO 63640; Ken Boren, (314) 756-4122
FOUR

Fast Trax Racing Assoc., mailing: 206 N. Water, Nixa, MO 65714; track: 318 Boonville, Springfield, MO 65802; Juan Montell, (417) 725-4337
FOUR

K.C. R/C Speedway, 11426 N. Walnut, Kansas City, MO 64155; Justin Baugh, (816) 436-3638
FOUR

Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912
FOUR

Mid-Mo R/C Raceway, 400 W. 2nd., Sedalia, MO 65301; (816) 826-5113
FOUR

Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828
FOUR

MONTANA

Bozeman R/C Powerhouse Track, 2825 W. Main (west side of Main Mall), Bozeman, MT 59715; (406) 586-0071
FOUR

Stormer Raceway & Slot Motorplex, P.O. Box 126 Hwy 2 East, Glasgow, MT 59230; (406) 228-4569
FOUR

NEBRASKA

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865
FOUR

River City Racing, Aksarben Field, Sales Pavilion, Omaha, NE 68164; Robert Conner, (402) 431-0482
FOUR

The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmitt, (402) 634-3414
FOUR

Wild Card Raceway, PR1 Box 137, Columbus, NE 68601; Roger F. Miller, (402) 564-7743
FOUR

NEVADA

Radio Controlled Race World, 905 So. Rock Blvd., Sparks, NV 89431; James or Barbara Balough, (702) 356-2882
FOUR

Silverbowl Speedway, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577
FOUR

Western R/C Raceway, 6404 Richmar, Las Vegas, NV 89139; Randy Grigg, (702) 897-7227
FOUR

NEW HAMPSHIRE

Economy R/C Raceway, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470
FOUR

Fastracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 352-0811 or 357-8393
FOUR

Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549
FOUR

Outback Raceway, East Washington Rd., P.O. Box 508, Bradford, NH 03221; Jim or Bill Thompson, (603) 938-2425
FOUR

Robert's Railroad & Hobbies, Box 431, Rt. 4 at Rt. 152, Northwood, NH 03261; Robert Jeffers, (603) 942-5193
FOUR

NEW JERSEY

Bob's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Bob Morrisco, (908) 446-3737
FOUR

Family Hobbies Raceway, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790
FOUR

Golden Hobbies Raceway, 415 Erial Rd., Pine Hill, NJ 08021; John or Iona Golden, (609) 782-1222
FOUR

Hobby Shop Speedway, 23 State Hwy NJ 08822; Patrick Clark or Eric Lee, (908) 806-7244 or (609) 737-1224
FOUR

Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525
FOUR

LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122
FOUR

Millville R/C Oval, 114 N. High St., Millville, NJ 08332; William Denstoz, (609) 327-4640
FOUR

Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)
FOUR

The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215
FOUR

Spernell Speedway, 2301 Rte. 9 North, Great American Flea Market, Howell, NJ 07731; Mitch, (908) 577-9191
FOUR

On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422
FOUR

Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717
FOUR

NEW MEXICO

Las Cruces R/C, 3110 Hillsdale, Las Cruces, NM 88005; Bob Risner, (505) 523-1962
FOUR

Meerscheid R/C Raceway Park, Walnut and Hadley, Meerscheid Park, Las Cruces, NM 88001; Wayne Ward, 2230 Coleen Ct., (505) 523-4863, (505) 326-1758
FOUR

NEW YORK

Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616
FOUR

Brockport Speedway, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224
FOUR

Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194
FOUR

C&D Raceway, 12542 NYS Rte. 12E, Chaumont, NY 13622; Chris or Don Bourquin, (315) 649-5403
FOUR

Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-7859
FOUR

Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140
FOUR

Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065
FOUR

Competition Hobby Supplies, 1006 Loudon Rd., Rte. 9, Latham, NY; (518) 786-3622
FOUR

East Coast Barn Stormers, #1 Old Oxford Rd., Chester, NY 10918; Michael or Lou, (914) 469-8206
FOUR

Hal's Hobby Shop, 120 Cayuga St., Fulton, NY 13069; Hal & April Halstead, (315) 598-2772
FOUR

Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940
FOUR

Li 1/4 Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384
FOUR

The Model Shop, 1 Lakewood Ave., Monticello, NY 12701; Richard Cimino, (914) 791-6075
FOUR

National Hobby Supply, 25 1/2 Webb Rd., Middletown, NY 10940; Bruce Roosa, (914) 342-6786
FOUR

N.Y. R/C Raceway, 300 W. 55th St., New York, NY 10019; Jack Zeiner, (212) 956-7296
FOUR

1/8 Raceway and Hobbies, 168 Broad Hollow, Farmingdale, NY 11735; George or Dora, (516) 845-7223
FOUR

Performance Hobbies Raceway, 205 North Ave., Webster, NY 14580; Anthony Cenzi, (716) 621-1274
FOUR

Performance Plus Radio Control Speedway The Hobby House, 1141 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772
FOUR

Peter's R/C Raceway, Rte. 36, Leicester, NY 14481; P. Gerald Scorsone, (716) 382-3126
FOUR

P.R.O. Speedway, 5 Washington St., Catteragus, NY 14719; Marc Pritchard, (716) 257-3101
FOUR

R/C Competition Corner, K-Mart Plaza, Mattydale, NY 13211; (315) 455-8718
FOUR

R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536
FOUR

R/C World, 69-57 Juniper Blvd. S., Queens, NY 11379; Norm, (718) 326-0002
FOUR

R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722
FOUR

Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456
FOUR

Ransomville R/C Raceway, 2576 Academy St., Ransomville, NY 14131; Irene Preisch, (716) 791-8310
FOUR

Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600
FOUR

Small Torque Racers of Long Island, 13 Melony Ave., Plainview, NY 11803; Thomas Bolger, (516) 938-9005
FOUR

South Shore Hobby & Raceway, W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567
FOUR

Transit Speedway & Hobbies, 5319 Transit Rd., Depew, NY 14043; (716) 684-7368
FOUR

Tri County Remote Control Car Club, 662 County Highway 122, Gloversville, NY 12076; Jim Sprouse, (518) 725-1279
FOUR

KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

Ulster County Speedway, P.O. Box 71,
New Paltz, NY 12561; Joe Colombo
Jr., (914) 754-7664

WESTFIELD R.C. SPEEDWAY

Westfield R.C. Speedway, 27 Clark
St., Westfield, NY 14787; John or
Jared Lindstrom, (716) 326-2339

WALL'S HOBBY

Wall's Hobby, 2 Dwight Park Dr.,
Syracuse, NY 13209; (315) 453-2291

ZOAR ROAD SPEEDWAY

ZOAR Road Speedway, 15318 Armes
Ct., Gowanda, NY 14070; David &
Gordon Ackler, (716) 532-9463

NORTH CAROLINA

The Antique Barn, 2810 Forest Hills
Rd., Wilson, NC 27893; Steve
Seidinger, (919) 237-6778

BADIN SHORE RACEWAY

Badin Shore Raceway, 1730 Jackson
Lake Rd., High Point, NC 27263;
Jimmy or Tim Martin, (910) 431-6407

C/C HOBBY SPEEDWAY

C/C Hobby Speedway, 8358 U.S. Hwy.
220 Bus. N., Randleman, NC 27317;
Steve & Mary Cox, (910) 495-3482

C&H RACEWAY

C&H Raceway, 1400 N. Cannon Blvd.,
Kannapolis, NC 28083; Camera &
Hobby Shop, (704) 933-5321

CAPE FEAR SPEEDWAY

Cape Fear Speedway, 207 Harley Rd.,
Wilmington, NC 28401; Bob Justice,
(910) 452-2354

CAROLINA DRAGWAY

Carolina Dragway, 907-D Warsaw Rd.,
Clinton, NC 28326; (910) 592-4569

CAROLINA HOBBIES R/C RACEWAY

Carolina Hobbies R/C Raceway,
Route 1, Box 158, Taylorsville, NC
28681; Kim & Roseanne Kulawik,
(704) 495-4040

CAROLINA MOTORSPORTS

Carolina Motorsports, 1517
Blandwood Dr., High Point, NC
27360; (910) 885-3713

CLAPP'S R/C MOTOR SPEEDWAY

Clapp's R/C Motor Speedway, Rt. 4,
Box 300A, Siler City, NC 27344; Al
Clapp, (919) 663-3198

CLINTON R/C RACEWAY

Clinton R/C Raceway, 907-C Warsaw
Rd., Clinton, NC 28328; Corbett
Marshburn, (919) 592-9489

CREEDMOR R/C SUPER SPEEDWAY

Creedmor R/C Super Speedway,
1781 Highway 15, Creedmor, NC
27522; Dan Cress, (919) 528-1546

HOBBIES, ETC.

Hobbies, Etc., 5540 Atlantic Springs,
Raleigh, NC 27604; Don Asplen, (919)
790-1444

HOBBIY PARK DRAGWAY

Hobby Park Dragway, W. Clemmons
Rd., Winston-Salem, NC; Jack Wright,
(919) 983-9416

KING R/C

King R/C, P.O. Box 897, Five Forks
Village, King, NC 27021; Chris Smith,
(910) 983-3969

KING SUPER SPEEDWAY

King Super Speedway, 143 Industrial
Dr., P.O. Box 897, King, NC 27021;
Chris Smith, (910) 983-5598 or (910)
883-3969

MINE HOLE GAP R/C RACEWAY

Mine Hole Gap R/C Raceway, 1297
Charlotte Hwy., Asheville, NC 28730;
Steve Shultz, (704) 628-3020

MOTORLEAD R/C RACEWAY

Motorlead R/C Raceway, 125 Park St.,
Canton, NC 28716; (704) 648-7911

RIDE & SLIDE R/C RACEWAY

Ride & Slide R/C Raceway, 5319
Yadkin Rd., Fayetteville, NC 28303;
Jim Woodman (910) 425-5276 or Bill
Culbertson (910) 867-4202

ROSEWOOD SPEEDWAY

Rosewood Speedway, Rt. 5, Box 853,
Goldsboro, NC 27530; Glenn Elam,
(919) 731-4734

S&S SPEEDWAY & HOBBIES

S&S Speedway & Hobbies, Rt. 1, Box
311A, Farmville, NC 27828; Ricky
Strickland, (919) 753-4422

SANDHILLS RACEWAY INC.

Sandhills Raceway Inc., US #1
South, Aberdeen, NC 28315; (919)
944-7414

Winston R/C Drag Series

Winston R/C Drag Series, W.
Clemmons Rd., Winston-Salem, NC
27106; Jack Wright, (910) 922-3800

NORTH DAKOTA

Hacienda Hills Speedway, 20
Hacienda Hills, Minot, ND 58701;
Kenny Duchscherer, (701) 839-4419

NORTHERN MINI RACERS

Northern Mini Racers, P.O. Box 415,
Minot, ND 58702; Roger Lee, (701)
839-5294

SURREY INTERNATIONAL RACEWAY

Surrey International Raceway, RR 1,
Box 37, Norwich, ND 58706; Marlen
Lenton, (701) 728-6760

VALLEY HOBBIE INC.

Valley Hobbie Inc., 2714 Main Ave.,
Fargo, ND 58103; Marshall Skare,
(800) 493-9971

OHIO

Aerotech Raceway, 409 Applegrove
Rd., North Canton, OH 44720; (216)
499-1300

BRYAN THUNDERDOME

Bryan Thunderdome, Townline Rd.,
Bryan, OH 43506; Brent Plund, (419)
924-2911

CLASSIC HOBBIES

Classic Hobbies, 1994 E. Waterloo Rd.,
Akron, OH 44312; Walt Ellis, (216)
733-6400

C/R HOBBIES AND RACEWAY

C/R Hobbies and Raceway, 323
Center St., Ashtabula, OH 44004;
Virginia Gagat, (216) 992-3833

CORCAR/ SAMS CLUB

CORCAR/ Sams Club, 128 Amity Rd.,
Galloway, OH 43119-8732; Bill
Stevenson, (614) 870-7159

D&J R/C RACEWAY

D&J R/C Raceway, 801 W. Market St.,
Orville, OH 44667; Don Yoder or
Mark Nussbaum, (216) 682-4266

D&S HOBBIES RACEWAY

D&S Hobbies Raceway, 7701 Crile Rd.,
Concord, OH 44077; (216) 354-2112

FLAG CITY RACEWAY

Flag City Raceway, 3772 C.R. 18,
Findlay, OH 45840; Ruth Hubbard,
(419) 422-5589

FUN FOR ALL HOBBY CENTER AND RACEWAY

Fun For All Hobby Center and
Raceway, 675 College Dr., Batavia, OH
45103; Steve Smith (513) 732-0440

HOBBIY MANIA RACEWAY

Hobby Mania Raceway, 6597 Route
224, Lowellville, OH 44436; (216)
536-8282

INNOVATIVE HOBBIES/LAKESIDE SPEEDWAY

Innovative Hobbies/Lakeside Speed-
way, 3427 Manchester Rd., Akron, OH
44319; (216) 645-1333

JB HOBBY & RACEWAY

JB Hobby & Raceway, 8760 St. Rt.
201, Tipp City, OH 45371; Bob Curtis,
(513) 845-8222

KENT HOBBY

Kent Hobby, 832 N. Mantua St., Kent,
OH 44240; Bob Sabo, (216) 673-0422

LAFFERTY R/C RACEWAY

Lafferty R/C Raceway, Box 153,
70228 Hurrah St., Lafferty, OH 43951;
Chris Christman, (614) 968-4818

LEWISBURG R/C RACEWAY

Lewisburg R/C Raceway, 395 US Rt
40E, Lewisburg, OH 45338; Bob
Harting, (513) 678-8404 or (614) 889-
0876

MEDINA R/C RACEWAY

Medina R/C Raceway, 754 N. Court
St., Medina, OH 44256; Bill Aholt,
(216) 723-0255

MR. T'S R/C SUPER SPEEDWAY

Mr. T's R/C Super Speedway, 5540
CR 16, Wauseon, OH 43567; Nick
Tinsler, (419) 335-3196

OFF-ROAD CAR ASSOCIATION OF OHIO

Off-Road Car Association of Ohio,
1702 1/2 S. Rockford, Tulsa, OK
74120; Mark Henderson, (918) 582-
0406

PERFORMANCE R/C CLUB OF OHIO

Performance R/C Club of Ohio, 2206
13th St. NE, Canton, OH 44705; Greg
Ledbetter, (216) 453-7089

RACING TO BRING YOU THE BEST!

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PRO-Line®

We Covered the World!

In 1993, Pro-Line captured the World Championships of Off-Road Racing in Basildon, England. Both 2WD and 4WD classes were swept by Pro-Line drivers using the revolutionary soft XTR rubber compound. At this year's Off-Road World Championships, Pro-Line again finished a winner. We covered the world as Pro-Line's new Squared Fuzzies—in the new, super-soft M2 compound—raced into Japan's Yatabe Arena and dominated both 2WD and 4WD. Proof in the tires: Matt Francis reached for a pair of Squared Fuzzies (#8089M2) to TQ in 2WD, and then he used the Squared Fuzzies to win the 1995 IFMAR Off-Road World Championships. Three out of the top four finishers in the 2WD A-Main used Pro-Line tires for a competitive edge; even World Champion Masami Hirotsuka, who finished second, reached for Pro-Line's new Squared Fuzzies for his 2WD car.

In 4WD, Brian Kinwald TQ'ed on a set of Squared Fuzzies, and



Todd Mattson and Tim Clark of Pro-Line with 2WD World Champion Matt Francis.

in the A-Main finals, 10 out of 10 drivers chose Pro-Line for the front and back of their 4WD cars. In the end, Mark Pavidis drove his 4WD Yokomo car to the winners' circle with Pro-Line's Squared Fuzzies to reign as the new 4WD IFMAR Off-Road World Champion. Pro-Line's Squared Fuzzies provided the ultimate traction in the most important international event of the year!

Squared Fuzzies have already been tested and raced across the United States, and they're proven performers when additional traction is necessary. Squared Fuzzies will only be offered in Pro-Line's exclusive M2 compound (super-soft), and a free set of foam inserts will be included with each pair. Special thanks to Matt Francis, Mark Pavidis, Cliff Lett, Mark Francis, Masami Hirotsuka, Craig Drescher and all the other drivers who chose Pro-Line tires at the 1995 IFMAR Off-Road World Championships in Japan.



#8089M2 Squared Fuzzies

FEATURES

- Square ultra-fine-pin design
- Low-profile "flat" carcass with reinforced interior and sidewall
- M2 super-soft compound
- Performance design for additional traction and control on the hardest racing surfaces

Product name: Fuzzies² (Squared Fuzzies)
Fits: 2.15-inch to 2.2-inch rear wheels.

Part number: 8089M2
Price: \$12.50

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Protoform



#1209—1995 Monte Carlo

1995 NORRCA Paved Oval National Champion

1994 ROAR Carpet Oval National Champion

Protoform race bodies continued to be the bodies of choice by winning drivers throughout the summer of '95.

Sean Cochran continued his domination of the high banks at Indy with another big win at the Velodrome Nationals. Mike Blackstock ran the second ever 19-lap run on his way to a TQ and a new track record. Mike Boylan smoked 'em in the Enduro to make it a clean sweep for Protoform T-Birds.

The Chevrolet Monte Carlo has without a doubt been the dominant car in NASCAR racing in 1995. We've been excited to see the performance record of the Protoform Monte Carlo (#1209) live up to the reputation established by its full-size counterpart.

Shane Kocker came down from Pennsylvania to the heart of NASCAR country—King, NC—to take on the "good old boys" at the CAM Challenge Race. At the end of a very hot and grueling 600 laps, Shane took his Monte Carlo home a winner—three laps ahead of the field.

At the NORRCA Nationals in Bakersfield, once again, Protoform-equipped racers set the pace. In winning the Factory Modified title, Tony Neisinger held off the very fast Eric Steenhoven with his Monte Carlo-bodied Spectre. In the Superspeedway Enduro, Tony claimed his second Nationals title of the day by finishing ahead of Kirby Hand, Derek Povah and Bill McAneney. All ran the #1209 Monte Carlo body.

As we begin to look forward to the 1996 season, Pontiac will have a contender for the Winston Cup Crown—the all-new '96 Grand Prix. It looks as if it will be a "killer shape" for R/C stock cars (again). Be sure to check out Protoform's all-new 1996 Grand Prix (#1214).

RACING TO BRING YOU THE BEST!

**P.O. Box 456, Beaumont, CA 92223;
(909) 849-9781; fax (909) 849-2968**

Scoters Hobby Hut, 234 Robbins Ave. #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411

A000000000

Steel Valley Hobbies & Raceway, 157 N. 4th St., Steubenville, OH 43952; William Northrop, (614) 282-3003

A000000000

T.A.R.C.A.R., 632 Eckle Rd., Perrysburg, OH 43551; Bill Bridges, (419) 826-3859 or Dave Scanes, (419) 893-1916

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Van Wert R/C Raceway, 112 W. Main St. (above Tom's Donuts), Van Wert, OH 45891; Charlie Hire, (419) 238-4917

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Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025

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OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416

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Competition R/C, 180 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809

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Coweta Hobby & Speedway, 310 S. Broadway, Coweta, OK 74429; Derald Seabolt, (918) 486-3948

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Off-Road Car Assoc. of Tulsa, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528

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Remote Control Race Course, 400 S. Vermont Ave., Suite 104, Oklahoma City, OK 73108; Rick or Steve, (405) 947-RACE

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Wild Country Speedway, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686

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OREGON

Cathie's R.C. World 443 So. Calapooia, Sutherlin, OR 97479; Wes/Cathie Buzzard, (503) 459-2746

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Competition Racing Assoc., 17941 NE Gilsan, Portland, OR 97230; Mark Taylor, (503) 257-0796

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Junior Vehicle Speedways, 3090 Starwood Ct., Medford, OR 97501; (503) 779-3090

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North Lawrence Raceway, 36 N. Lawrence, Eugene, OR 97401; Gary Hill, (503) 484-9857

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Pit Stop Hobby, 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (503) 265-2825

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R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188

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R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298

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Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234

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PENNSYLVANIA

A&D's Bumps & Jumps, RR7, Box 7395C, Stroudsburg, PA 18360; Dan Ambrosio, (717) 424-1750

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Benders Junction Speedway, 2300 Benders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161

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Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonnell, (814) 849-7385

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CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635

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Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045

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Clearfield R/C Raceway, 4 Capricorn Ct., Clearfield, PA 16830; Shawn Richards, (814) 765-5608

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Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506

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DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200

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Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052

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East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602

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Henning Scale Models R/C Raceway, 128 S. Line St., Lansdale, PA 19446; Bill Henning, (215) 362-2442

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Hipkins Hobbies Raceway, 402 W. Avondale-New London, West Grove, PA 19390; Doug Hipkins, (215) 869-8585

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Hobbies & Stuff, 116 West Apple St., Connelville, PA 15425; Mark Schomer, (412) 628-0228

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Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765

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Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (610) 269-1300

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Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866

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Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223

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Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458

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Modelbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925

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Mt. Laurel Speedway, 835-8 Hiester Lane, Reading, PA 19605; Joe Vaccaro, (215) 921-0176

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The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850

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Owens Race-A-Rama, RR 2, Box 98 F, Hunlock Creek, PA 18621; Rany Owens, (717) 477-3220

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Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA; John (215) 632-9744, Bob (215) 945-0325

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Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavage and Don Fewkes, (610) 622-7651

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Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288

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R/C Raceway 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490

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Riverside Raceway, PA Ave. W. & Hickory, Warren, PA 16365; Jeff, (814) 723-4211

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Road Runner Raceway, 1027 E. 7th St., Bloomsburg, PA 17815; John, (717) 784-1260

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S.A. Hi Banks, Hahn's Dairy Rd., Palmerton, PA 18071; Scott Andrews, (610) 377-6123

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Sinking Spring Race Center, 237 South Hill St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760

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South Mountain R/C Speedway, 357 Furnace Rd., Wernersville, PA 19565; George Merkel, (215) 267-4736

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Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445

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TC's R/Cs, 1537 Freeport Rd., Natrona Heights, PA 15065; Tom Coriale, (412) 226-8802

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T-N-T Raceway, Randolph Rd., Great Bend, PA 18821; Ed Kraft, Rd. 1 Box 199C, Hallstead, PA 18821, (717) 967-2604 or Frenchie (607) 775-1756

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Wagonhill Hobbies, 967 New Castle Rd., Rt. 422, Butler, PA 16001; Jeff Hyatt, (412) 865-9877

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Willow Mill Speedway, 37 N. Season's Dr., Dillsburg, PA 17019; George Verbowitz, (717) 432-4445

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PUERTO RICO

Hacienda Muñoz R/C Track, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083

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RHODE ISLAND

SK Hobbies Inc., 15 Carl St., Johnnston, RI 02919; Slim or Keith, (401) 453-1440

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Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908

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SOUTH CAROLINA

Bandit's Performance R/C Hobbies, 2037 S. Main St., Darlington, SC 29532; Bryan Howie Jr., (803) 393-3333

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Coastal R/C Speedway, 8553 Hwy. 544, Myrtle Beach, SC 29577; Wendel Smith, (803) 236-9309

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The Great Escape, 105 Franklin Ave., Spartanburg, SC 29301; Jonathan Bowen, (803) 574-5273

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Hobbies and More, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355

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J&M R/C Hobbies, 5341 Dorchester Rd., Evanston Plaza, N. Charleston, SC 29418; Mike Smith, (803) 552-9449

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ORA Atomic Racing Facility, 373 Boyd Pond Rd., Aiken, SC 29803; Bill Jackson, (706) 855-0846 or (803) 642-0314

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R/C Speed Shop & Raceway, 2122 Platt Springs Rd., W. Columbia, SC 29169; Eric Prevost, (803) 791-4715

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Racer's Choice Remote Control, 4014 Fernand Rd., Piney Grove Shopping Center, Columbia, SC 29212; Clifford McLinden, (803) 561-0000

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World Hobbies, 707 Sulphur Springs Rd., Greenville, SC 29611; Bob Pittman, (803) 246-4702 (Closed after 4:00 pm Mondays)

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SOUTH DAKOTA

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604

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PRO-LINE TRACK DIRECTORY

TENNESSEE

Action Hobby Shop, 3723 S. Mendenhall, Memphis, TN 38115; Brian Stricklin or Justin Austein, (901) 365-2620

Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 30715; Jamie Pate, (615) 792-4371, ext. 1195

D&M's Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37033; (615) 681-8919

Lawson Raceway, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (615) 995-9351

Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630

MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027

Robertson's R/C Raceway, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (901) 424-6423

Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Erod, Rt. 5 Box #652, Sparta, TN 38583, (615) 836-8450 or (615) 761-3407

Tri-County R/C Raceway, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763; Dwayne Romine, Kyle Romine, (615) 376-2330, 376-9955

TEXAS

AA Raceway, 1617 Foomey Rd., Austin, TX 78704; Wolf Gurfory, (512) 474-8277

Austin R/C Center, 9702 Gray Blvd., Austin, TX 78758; Caton Cobb, (512) 832-8144

Big Mike's R/C Raceway, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814

Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Heinz Falke, (713) 399-1527

Flip & Spin R/C, 5957 Jones Rd., Bryan, TX 77807; Garland Crabb, (409) 822-7311

Hal's Hobby Raceway, 1440 Bessemer, El Paso, TX 79936; (915) 591-2213

Heart o' Texas Hobbies & Raceway, 309 W. Hwy. 190, Copperas Cove, TX 76522; Larry Gholson, (817) 547-7505

Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761

Hobbytown USA, 7516 FM 1960 W., Houston, TX 77070; Fred Pfatman, (713) 955-7097

Hobbytown USA, 999 E. Basse Rd., Suite 177, San Antonio, TX 78209; Joe Sena or Clark Baisdon, (210) 829-8697, fax (210) 829-8707

Houston R/C Hobbies, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006

Indy R/C World, 220 Mesquite Village, Mesquite, TX 75150; (214) 271-4844

Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett (409) 693-8095

Rivercity Speedway, 11731 Wetmore, San Antonio, TX 78247; Ralph Hernandez, (210) 359-6870; Joe Toledo, (210) 341-5652

Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (214) 517-6105.

Star Hobbies, 1280 Hwy. 100, Box 5, Port Isabel, TX 78378; Fred Carr, (512) 943-7546

T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562

Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401

Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224

UTAH

Fastrax, 355 N. 700 E., Price, UT 84501; Dave Johnson, (801) 637-6603

Hansen Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; Kevin Hansen, (801) 250-8303

Power Hobbies and Raceway, 135 No. 900 E., Suite 7, St. George, UT 84770; April Nutley, (801) 628-8747

WOR Raceway, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801) 393-2530

VERMONT

Bradford R/C Racing, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674

Mike's Hobbies & Raceway, 162 N. Main St., Rutland, VT 05701; Stephen Rachlis, (802) 775-0059

Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321

VIRGINIA

Bob's Hobbies & Raceway, 910-J Brandy Creek Dr., Mechanicsville, VA 23111; Bob Wagner, (804) 746-2758

Cooper's R/C Raceway, Rt. 4, Box 122B, Chatham, VA 24531; (804) 724-4182

Crossroads Hobbies R/C Raceway, 1104 W. Main St., Salem, VA 24153; Ronnie Black, (703) 387-3414

Dad's Day Off Hobbies & Speedway, 940 Radford St., A-1 Flea Market, Christianburg, VA 24073; David A. Schuh, (703) 382-9811

Fairystone R/C Speedway, Rt. 4, Box 918, SR635, Stuart, VA 24171; Pat Moon Jr., (703) 930-3984

Hobby Hangers Speedway, 4433 A Brookfield Corp. Dr., Chantilly, VA 22021; Mark or Billy, (703) 631-8820

The Hobby House, 116 Edds Ln., Sterling, VA 20165; Ron Beckman, (703) 444-0333

KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596

Shamrock Raceway, P.O. Box 3739, Winchester, VA 22601; Kevin Allen, (703) 662-0403

Timberlake Hobbies, 212 14th St., Virginia Beach, VA 23451; Doris Creea, (804) 491-8016

Trackside Hobbies, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell of Tom Gunther, (804) 723-4170

WASHINGTON

Alfie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638

Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary & Sharon Brown, (206) 491-2430

Hale's R/C Raceway Park, 10611 136th St. E. Puyallup, WA 98374; Walt Hale, (206) 845-7675

Home Town Hobby, 116 N. Main Ave., Ridgefield, WA 98642; (206) 887-1769

L&L R/C Raceway, 15818 S.E. 287th, Kent, WA 98042; Bob Lewis, (206) 631-1664

Performance R/C, P.O. Box 955 (1673 Cedarvale Rd.), Mt. Vernon, WA 98273; (206) 755-9464

Raceway Hobbies, 188 Sunset Ave. S., Edmonds, WA 98020; Dave or Ron Steen, (206) 774-3285

Rattlesnake R/C & Raceway, Brag T-121 Big Pasco, Pasco, WA 99301; Bill Brandt, (509) 545-4495

Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failia, (206) 653-8838

Skagit R/C Raceway, 1689 Routon Ln., Burlington, WA 98233; Jeff, (206) 724-3453 or Craig, (206) 755-9464

Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matson, (509) 534-RACE

Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; Nell Bade, (206) 565-1935

Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8659

BAFB R/CAR, Bolling Air Force Base, Washington, D.C. 20332; Charles Leadbetter, (301) 297-4524

WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487

Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355

WISCONSIN

ABC R/C, 1441 B East Main St., Waukesha, WI 53186; Dick, (414) 542-1245

Antigo Hobby, 311 Superior St., Suite 7, Antigo, WI 54409; (715) 623-7655

Bayland Hobbies, 951D Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, (414) 339-8288

JJ's Dirt Heaven, 6028 County K, Champion, WI 54229; (414) 866-9096

NARCAR Raceway, 4331 E. Wall St., Eagle River, WI 54521; Mary O'Brien, (715) 479-5154

R/C Hobby Off-Road Track, Lewison Lane, Viroqua, WI 54665; Dan and Diane Sawvell, (608) 637-8221

Radio Mania, 129 Harrison St., North Prairie, WI 53153; Bill Bowes, (414) 392-9515

S&N's Trackside Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

Sparta R/C Raceway, R&S, Sparta, WI 54656; Eric Johnson, (608) 269-6613

WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156

AUSTRALIA

Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128

Canberra Off-Road Model Car Club, Goyder St., Narrabundah, ACT 2604; Graham Brown, 61-6-241-3070

Central Coast ORRC, EDSACC Sports Complex, Bateau bay, N.S.W. Australia 2261; Peter JKnight, 011-61-43-693-698

Illawarra RCECC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Mel or Andrew, 042-714-683

Lakeside R/C Racing Car Club, Hollywood Dr., Lansvale, NSW 2166; R. Bartolozzi, 62-2-907-9800

Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 011-6160-247-128

BELGIUM

Cartroubles Indoor Buggy Track, Jan Moonstraat 52-56, 2160 Worme-Igelm, Belgium; Guy Ermes, 32-3-326-51-15; fax, 32-3-326-51-01

M. B. V Parc of Relst, Tenierslaan, 28, B1910 Kampenhout, Belgium; Frank Mostrey, fax (32) 0-16657518

MBV-Kampenhout, Tenierslaan 28, Kampenhout B1910, Belgium; Frank Mostrey, phone and fax (0) 16-65-75-18

Model Racing Club Oudenaarde, Scheldekant, 9700 Oudenaarde, Belgium; A. Chanterle, 32-55-31-36-48; fax, 32-55-30-19-12

BRAZIL

Brasilia R/C Motor Circuit, Estacionamento do Estadio Mane Guarrincha, Brasilia, DF 70000, Brazil; Alexandre (Alex), 55-061-273-7205

Hobby Center, SQS 210 Bl.H Apt. 204, Brasilia, DF-Brasil 70 273; 061-242-0488

Off Roaders, Av. Guillermo Dummont Villargis, 317, Sao Paulo, CEP 05640; Waldir Ielpo, (055) 011-260-5628; fax (055) 011-831-4931

Way of R/C Off-Road Cerrado, Rua Paraiba 1323, 1st floor, Belo Horizonte, Minas Gerais; Claudio T. Correa, (031) 227-6111, fax (031) 227-6869

CANADA

Action Weelz, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756

ATN, Auto Teleguide Nicolet, 2000 Rue Paul Hubert, Saint-Jean-Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097

Auto Sprint, 6065 Des Grands Prairies, St. Leonard, Quebec H3G 2R6; David Kalayjian, (514) 287-3503

Circuit Pepsi, Centre de Location, 37 du Roi, Sorel, Quebec, (514) 746-8828

Circuit Plessis, 260 Raug 9 Ouest, Plessiville, Quebec, (819) 362-3743

Circuit R/C Pro, 1500 Chemin Sullivan, Val d'Or, Quebec, (819) 362-3743

Circuit R/C, 1500 Chemin Sullivan, Val d'Or, Quebec, (819) 362-3743

Circuit Teleguide St. Roch, 363-B St. Charles, St. Roch De L'Achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554

Club Avatt, 244 Jules-Richard, Deauville, Quebec J1N 3M2; Daniel Vanier (819) 864-6262

Club RC51, 44 Rue Holliday, Sept-Iles, Quebec G4R; Sylvio Gerard (418) 968-6575; hobby shop (418) 962-6565

CRCCC, Box 309, Clinton, Ontario NOM 1L0; Eric Russell (519) 482-9429

Dynamic Hobbies, 21 Concourse Gate, Unit 6, Nepean, Ontario, K2E7S4; Clark Freeman, (613) 225-9634

East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island C1A 8X9; Gary Stephen, (902) 569-3262

Evolution Speedway, 1935 Glengrove Rd., Pickering, Ontario L1V 1X3; Eric Lang, (905) 839-2084

Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411

Fly 'N Bryan's Radical Raceway & Little Shop of Hobbies, RR #1, Site 12, Comp. 49, Chase, British Columbia, Canada V0E 1M0; Bryan Coffey/ Dani Potvin, (604) 955-0669

Hobbypro Raceways Ltd., 16020-132 Ave., Edmonton, Alberta T5V 1M1; Tony or Ian, (403) 455-RACE (7223)

Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530

KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vanhieuwenhuizen, (604) 374-1268, (604) 374-8458

F1000

J-T International Raceway, 127 Milligan Lane, Napanee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099

F1000

MORRAC Raceway, 6449 Crowchild Tr. SW, Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386

F1000

Off-Road R/C Raceway, 76 Eddystone Ave., North York, Ontario M3N-1H4; Ron LeFebvre, (416) 740-0536

F1000

Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. V2M5R8; Doug Waller, (604) 561-0035

F1000

Quintrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306

F1000

Randy Shantz Raceway, 1015 W. 14th St., North Vancouver, British Columbia; Steve Muirhall, (604) 945-3888

F1000

RC World, 7070 Haldibrook Rd., RR #1, Caledonia, Ontario N3W 2G8; Don Nicholls (905) 679-3177 or Keith Seguin (905) 388-9855

F1000

Ronbo's R/C Racing, RR 1 Glen Walter, Cornwall, Ontario K6H 3G4; Ron Giroux, (613) 936-0176

F1000

Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateauguay, Quebec J6K 3B4; (514) 698-2151

F1000

Sheldon's Raceway, Box 597, Cutknife, Saskatchewan; Sheldon Bradlow, 398-2232

F1000

Spinnin Wheel Raceway, RR 1, Ariss, Ontario N0B 1B0; (519) 824-1614

F1000

South Okanagan Roadhogs, Skha Lake Rd., Penticton, BC; Willie Lemm, (604) 492-5698

F1000

Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855

F1000

Thunder Alley Raceway, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P6; Rob Smith, (519) 882-3361

F1000

Vancouver R/C Road Racers, #100-2733 Barney Hwy., Coquitlam, British Columbia V3E1K9; Roger Brown, (604) 945-3888

F1000

COLUMBIA

Club De Automodelismo Colombiano, Centro Recreativo Cafam, Kilometro 14 Autopista Norte, Santafe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

F1000

Club De Automodelismo Colombiano, Centro Comercial Guaymaral, Kilometro 16 Autopista Norte, Santafe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

F1000

Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cutca, Colombia; Gabriel Rodriguez, 975-751892

F1000

CYPRUS

Racing Model Club, Kennedy Ave. N. 42, Nicosia, Cyprus; Andrea Sotiriou, 493186; fax 493229

F1000

DENMARK

Brondby Motor Club, Roskildevejs 460 Rodov, Denmark 2610; Soren Boy Holst, 011-45-31-472-462

F1000

Holstebro R/C Buggy Club, Mozartsvej 7500 Holstebro, Denmark 2600; Michael Brushholt, 011-45-97-412-734

F1000

Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691

F1000

Rainbow Raceway, Eriksvej 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504

F1000

Thor Minirace Odense, Sohusevej 255, Alleso, Odense, Behind Alesso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707

F1000

DOMINICAN REP.

Adoca R/C Speedway, Feria panadera, Santo Domingo; (809) 220-5266

F1000

La Barranquilla R/C International Speedway, Santiago; (809) 582-2303

F1000

ENGLAND

Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657

F1000

FRANCE

Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudouit, 95 082763

F1000

Crame Roncq, 64 rue du Becquerel, 59370 Mons el Baroeul, France; Michael Hondekyn, (33) 20042755

F1000

Lorgies Bolides, rue Beau-Riuz, 62840 Lorgies, France; Mme. Hourdequin Sabine

F1000

GERMANY

Dreykorn Raceway, Heuchling-Hauptstr. 43, Lauf, 91207; Hermann Hensel, 09123-81457

F1000

MC Köln, Bottgerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493

F1000

Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609

F1000

Oberhausen-Alstadt, Am Fesderturn., Oberhausen, Germany 46099; Josef Holl, 0208-403676

F1000

Panik Raceway, Teutonen Str. 5, Jroisdorf, Germany 53844; Guido Kraft, 0224-400259

F1000

Stoppelhopper Oberhausen, Niebuhrstr., Oberhausen, Germany 46049; Matthias Reckward, 02801-1545

F1000

GUAM

R/C International Raceway, P.O. Box GK, Agaña; Robert (Buddy) Simpkins, (671) 477-3207

F1000

HONDURAS

Autodromo Accion, Quinta Santa Maria, San Pedro Sula, Honduras, Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

F1000

HONG KONG

H.K.R.C. Model Car Racing Club, Lot 2130-2137, Ho Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822

F1000

Kingsville Buggy Arena, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828

F1000

INDONESIA

Cipaku Indah Speedway, J1 Cipaku Indah II/2, Bandung 40143, Indonesia; Cipaku Indah Hotel, Brad Lake, 011-62-22-210219

F1000

Everly's Racing, Palm St., 188, Surabaya, Jatim, Indonesia; Jhon Mudik, 011-62-31-595-888

F1000

ISRAEL

Ircca Off-Road, Rahanana, Israel; Yaron Zafris, (972) 030549937

F1000

Nahshoneat, Abba Nile Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252

F1000

ITALY

Associazione Modellisti Cossato, via P. Maffei, Cossato 13014, Biella, Italy; Zanellato Romildo, 015-405881; fax 015-922709

F1000

JAPAN

Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

F1000

Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674

F1000

Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

F1000

Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-61173-3662

F1000

Misawa R/C Raceway, 13th Fighter Squadron, PSC 78, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 228-6506

F1000

Yokata R/C Racers, PSC #78, Box 3619, APO AP 96326, Tokyo, Japan; Victor Giles, 011-81-0425-52-2511 ext 225-9025

F1000

Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478

F1000

LEBANON

Wild Willy R/C, Oscar St-Jal Eddie, Beirut, Lebanon; 00961-1-403751

F1000

MEXICO

Aices Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 6-1476, 61477, 86729

F1000

Baja Jr., H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gaby Macias, 681-20276; fax, 681-26430

F1000

Club Kyosho de Automodelismo Departino, Av. Pacifico 216 Coyoacan; Ajusco-Toluca Km 15.3 DE, Mexico 04330, Ing. Jorge Perez Holder, (525) 544-08096; fax, (525) 544-7133

F1000

Hobby Centro, 12 De Diciembre No. 3070-A, Guadalupe, JAL 45550; Alejandro Ortiz Del Toro, (36) 21-46-28

F1000

Hobby's Formula, Au observatorio 457 DF 01120; (905) 502-3620

F1000

Hobby Model's Raceway, Blvd. Garcia de Leon, 1555, Morelia, Michoacan 58260; (431) 5-01-22

F1000

Jaguar R/C Club, Calz. Zavaleta 116, Puebla 72150; Chema, Denise or Chiro, (22) 31-00-91, (22) 33-00-94

F1000

La Hielera, Prol Corregidora Nte 350, Queretaro, QRO C.P. 76160; Jorge Morelos Rabell, (42) 12-15-25

F1000

Pista Casino, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhart, (73) 19-12-38

F1000

R/C Racing Club, Obsidiana #2900, Zapopan, Jalisco 44560; Fernando Hernandez, (3) 616-73-47

F1000

Tony's Track, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, (67) 165708-168141

F1000

NETHERLANDS

H.F.C.C. Hollandia, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820

F1000

NEW ZEALAND

Counties R/C Raceway, Puakekohe Showgrounds, Station Rd., Puakekohe, New Zealand; R. Northcott, 09 23 86904

F1000

Harewood Radio Control Car Club, 550 Sawyers Arms Rd., Christ Church, New Zealand; Dean Johnson, 09 03 3880 344

F1000

Papakura Indoor R/C Car Club, 25 Tainere Cres., Papakura, Auckland; Colin Perry, (09) 298-4711

F1000

Western District R/C Off-Road Car Club, CNV Bancroft/Akatea Drive, Auckland; Chris, (09) 838-5201

F1000

NORWAY

Aurskog R/C Club, Aursmoen, 1930 Aurskog, Norway; Tommy Gjeleseth, 47-63-86-21-61

F1000

Dalen Raceway, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 64 52 95

F1000

Hadelund Raceway, 2750 Gran Gran Norway; Dag Bakke-Nilsen, 61330405

F1000

Store-Baller Raceway, 2750 Gran Gran Norway; Ola Raastad, 61330225

F1000

PHILIPPINES

Boyer R/C Hobby Shop, Unit No. 10 Lucas Commercial Center, Marcos Hiway, Mayamot, Antipolo, Rizal; Jose "Boy" Chua, 721-2555

F1000

Philippine F1/Touring Club, Super Mall I, EDSA, Quezon City 1156; Raymond Aguilar/ Ron Villafior, 896-64-15/23-30-08

F1000

Philippine R/C Association, B.F. Homes Paranaque, Metro Manila 1700; Ronald/Manny Villafior, 23-30-08

F1000

Quezon City Radio Control Club, Quezon City Memorial Cir., Quezon City; Benjie Lumanlan, 731-94-53

F1000

SOUTH AFRICA

Banana County R/C Racing Club, P.O. Box 988, Margate, 4275; Dennis Steenmans, 27 (0) 391-20975

F1000

Gordons Bay R/C Club (GBRC), Andrew Norman Sports Centre, Gordons Bay, Cape Province; Andre Hollander, 024-512865

F1000

SPAIN

ADAM, Mina Flores de la Sienna, Madrid, Spain Alvaro Sarabia, 01-7471113

F1000

Club Modelismo Catilla, P.O. Box 491, Burgos, Spain 09080; A.J. Pereda, 011-34-47-240130

F1000

Club Social Sevillana, Crta. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282

F1000

Motoclub Castellon R.C., Rafalafena, S/N, 12004 Castellon, Spain; Octavio Traver, (34) 64 229705, (34) 64 237411

F1000

Outlaw-Ultima II, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298

F1000

ROARCR, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); PO Kelly Sexton, 011-34-56-822652

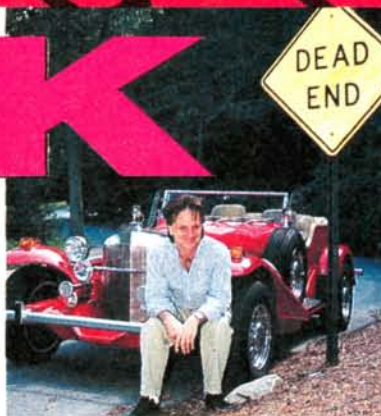
F1000

CRAEM, La Elipa, Madrid, Spain; Pablo Lorente, 91-3865952

F1000

SWITZERLAND

BACK LOT



This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chris@airage.com

Quiz Show

So, you think you're quite the R/C buff? You know all there is to know about this wonderful hobby and this magazine. You eat, sleep and live R/C! Well, to see if you're really on the ball, why don't you take a few minutes to take this short quiz. These multiple-choice questions relate to just about every R/C topic imaginable. A few of the questions one answer, so you might have more than one answer, so you have to really be on your toes to be the it-all. Here's how the if you answer all the questions correctly, you are in fact a true-wool R/C aficionado; one wrong, and you're knocked down a rung on the ladder to R/C junkie status; two wrong, and you're still qualified to give out R/C advice to newcomers at your local track; three wrong, and you're considered more of an R/C wannabe; four or more wrong, well, then you're not quite the R/C buff that you thought you

were. Maybe it's time to read your copies of *Car Action* a little more thoroughly! So check it out, and good luck. The answers appear at the bottom of the page. No peekin'!

1 Who won the '93 IFMAR Off-Road World Championships?

- A. Brian Kinwald
- B. Masami Hirosaka
- C. Joel Johnson
- D. Ray Jay Johnson

2 The fastest recorded speed of an R/C car so far is:

- A. 87.41mph
- B. 105.6mph
- C. 66.38mph
- D. 130.3mph

3 In our coverage of the 1994 RCHTA Hobby Trade show, we featured a photo of a famous

celebrity. Who was it?

- A. Neil Diamond
- B. Neil Armstrong
- C. Neil Young
- D. Neil Sedaka

4 We all know that Team Losi's newest truck is the Double-XT, but what was the name of their first race truck?

- A. JRX-T
- B. Junior-T
- C. JRX-2
- D. Pro-XT

5 Where were the first 1/10-scale On-Road IFMAR Worlds held?

- A. England
- B. Australia
- C. Sweden
- D. California

6 What famous driver was shrunk down next to an RC10 in an Associated advertisement?

- A. Cliff Lett
- B. Jammin' Jay Halsey
- C. Rick Hohwart
- D. Butch Kloeber

7 In what year did your favorite magazine, *R/C Car Action*, first hit the stands?

- A. 1984
- B. 1986
- C. 1988
- D. 1983

8 Which manufacturer's car won the 4WD category at the '86 IFMAR Off-Road Worlds?

- A. Kyosho
- B. Yokomo
- C. Schumacher
- D. None of the above

9 My dog's name is?

- A. Bella
- B. Luna
- C. Pukey
- D. Sport

10 Which famous movie character has graced our cover in the past?

- A. The Terminator
- B. Alien
- C. Robocop
- D. The Predator

ANSWERS

1. A and B—remember, there are 2WD and 4WD categories
2. B—George Estévez with his wild dragster
3. C
4. D—There were no JRXs
5. D—At the Ranch Pit and '87 and '88
6. B
7. B
8. D—There were no 4WDs
9. C
10. A